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MECHANICAL ENGINEERING DEPARTMENT

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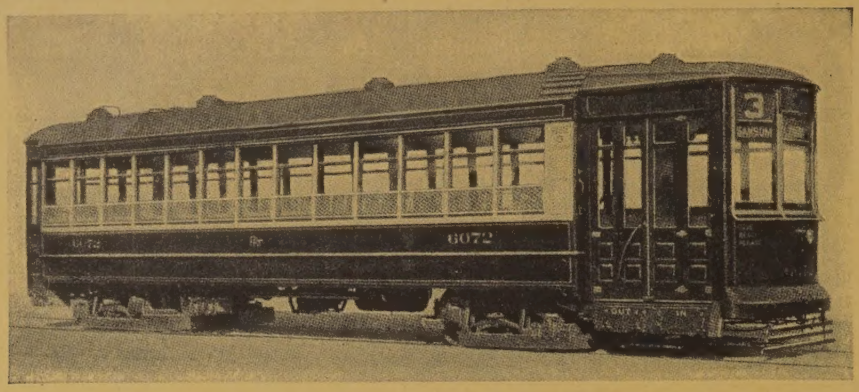

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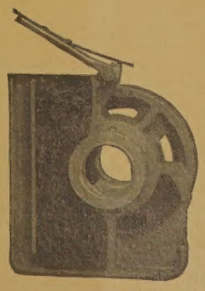

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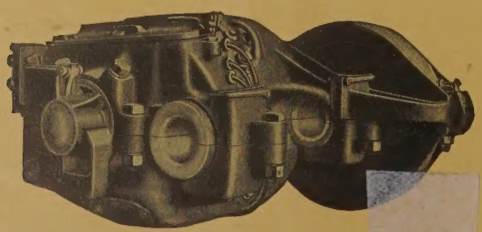

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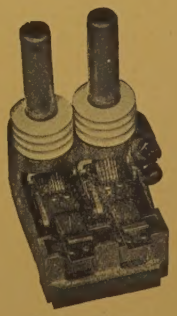

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DEVELOPMENT OF PARK TRAFFIC

The summer traffic season in the Northern States was delayed a little this year by the low temperature which prevailed generally. However, it is now the season when the hot days invite pleasure riding. Are the street railway companies doing all that they can to accommodate this traffic? It appears that in many cities the companies and the city can co-operate with advantage to render public pleasure grounds more accessible to the people. This is necessary if the public is to get the full benefit of its large investment in such property. Many women and children are unable to walk long distances and for this reason do not get far beyond the points to which they may ride on the street cars. While it may not be practicable or advisable to operate cars directly through all parks so as to bring every part within easy walking distance of passengers, it is practicable frequently to construct track and operate cars along one or more sides of the property devoted to such purposes. It has been observed that this policy, as adopted in one large city recently, has been effective in increasing the number of public visitors to the park and incidentally in increasing the amount of street railway patronage to and from this point. As park travel is made up mostly of business which can be carried without interference with the regular normal traffic of the railway, it is in the interest of the company to develop it as far as possible. It is equally wise for any city to encourage the public to get the fresh air as often as possible. The addition of new trackage in order that park traffic may be stimulated is a subject that is worth careful study when the construction program for 1913 is made.

LIGHT RAILWAY EQUIPMENT

During the past two years or so very commendable progress has been made in reducing the weight of trucks, motors and car bodies used for city service. One of the greatest troubles in getting light equipment has been the fact that, although on the whole the demand for it is now considerable, it has been regarded as special. Why cannot the good work which has been accomplished toward standardization in heavy interurban cars and equipment be extended not only to the typical city road but also to the suburban railway? In the case of the interurban lines the results from the standpoint of the manufacturer have been good, and an equal benefit should follow the adoption of recognized standards of motor cars of moderate size and weight equipped for the lighter tasks of electric railroading. The need on suburban lines is particularly marked. Until it is supplied the railway manager will always find himself in the embarrassing position of calling for special apparatus at an abnormal price, when he really wants nothing but a simple and straightforward light equipment which could be made and sold at a comparatively modest figure if its use was encouraged. Nothing will more certainly lead to heavy repair bills than to put a heavy interurban car on a suburban railway not too solidly built and kept up with only average care. Nor is it good policy to relegate

to these light lines the ancient rolling stock inherited from some city system. There should be a recognized and well-defined standard of equipment for the lighter service of electric railways, and we hope to see steps taken in the near future to establish it.

CONTROL OF TIME-POINT OPERATION

The degree to which effective control can be exercised over the running time of cars even on a large city system with dense traffic is indicated by some data in the report of the Vienna Tramways for the year 1911. Since the spring of 1910 the management of this railway has installed control clocks at forty-six time points on several routes in order to determine how much the motormen run ahead or behind their schedules. The result of this installation has been a very noticeable improvement in the maintenance of uniform headways and greater care in operation. Thus, hardly more than 1 per cent of the overspeeded cars were found to be more than 1 minute ahead of time, while 91 per cent of the delayed cars were late only 3 minutes or less. This actual registration of car movement appears more satisfactory than the ordinary time-point system, since the latter merely indicates to the crews when they should pass given places. The usual method is also open to the objection that it is practically impossible to have the watches of all of the men keep perfect time. The adoption of these control clocks has evidently made the Vienna motormen appreciate the fact that their operation from point to point can be accurately watched, and hence the temptation to make up for lost time on one section by reckless running over another has been strongly curbed. It is worthy of note also that the Vienna cars are equipped with meters, so that the management has a double check on the ability and care exercised by its motormen.

SPONTANEOUS HEATING OF COAL IN STORAGE

The recent report of the United States Bureau of Mines on the deterioration and heating of coal in storage offers considerable evidence against the commonly accepted belief that coals containing a high percentage of sulphur are peculiarly susceptible to spontaneous combustion. The paper states that in numerous cases the bureau's investigations have shown that the bulk of the sulphur does not oxidize when spontaneous heating is taking place. In one case, for instance, a number of samples, taken from the storage piles of a Boston power plant, which had undergone spontaneous heating showed that 90 per cent of the sulphur still remained unoxidized and manifestly could not have been the cause of the spontaneous combustion. The report also attacks the theory that a high volatile content in itself causes heating, as 260 instances of spontaneous combustion reported from a list of 1200 large coal consumers are nearly equally divided between high and low volatile coals. The heating of coal storage piles is, of course, one of the most annoying occurrences about a power plant. In most cases it is accepted as inevitable, but, if it is not largely due to the character of the coal itself and is rather the result of improper methods of handling or piling, there is reason for making a considerable effort to eliminate the evil. Of the remedies offered, that of allowing at least six weeks "seasoning" after mining and before storing is probably the most easily followed. Another is to crush after storing, not before, although the latter condition is, of course, compulsory with all plants having large overhead bunkers feeding into stokers. The circulation of air in the interior of the piles, caused either purposely by ventilating pipes or otherwise by allowing the large lumps of coal to roll to the bottom during the process of piling, can also be avoided in most cases. None of the remedies is a panacea, but in view of the findings of the Bureau of Mines there is no logical reason why all of them which are not unreasonably expensive or complicated should not be employed.

THE SUPPLY MAN AND THE STEAM RAILROAD MAN

An interesting departure in the relations between the supply men and their customers, the railway men, was made at the last convention at Atlantic City of the Master Car Builders' and American Railway Master Mechanics' Associations. Heretofore the plan followed at these conventions has been that of allowing the supplymen's association to defray all the expenses of the entertainments at the convention. This plan was one sanctioned by the usages of many years, and the arguments in its favor were that as it was natural that the supply man should play the part of host and that the railway man should be his guest, it was better as well as more economical that the entertainment should be conducted by wholesale and should be furnished by the supply men's association. The initiative for a change came not from the supply men but from the executive officers of the railways themselves. The result was that the two railway associations interested insisted, before their June convention, that the entire cost of the entertainment there should be divided between the two railway associations and the supply men's association in proportion to the number of those in attendance from each, so far as such a division could be approximated in advance of the meeting.

The motive which stimulated this plan may seem supersensitive to some. Nevertheless, the *Railway Age Gazette*, which reported the meeting in a daily issue and was in the best position to judge the entire matter, says that it was a move in the right direction. The same paper, explaining the feeling which actuated the railway officials in insisting upon this action, says:

"During recent years the limelight of publicity has beaten with increasing fierceness on the railways, and their executive officers have grown more and more sensitive regarding the doing of anything which might be construed in such a way as to reflect any discredit on railway management. The original intimation that the soft pedal should be applied to certain diversions in connection with the conventions, which might be perfectly innocent but open to misconstruction, came from the executive officers, and the changes made this year amounted to an expression of opinion by the executive officers and men of leading influence in the mechanical associations that some features in connection with the conventions interfered with their serious business or were open to misconstruction. . . . It was also felt that the policy of permitting the supply association to defray all of the expenses of entertainment . . . was open to the

criticism that it established an improper relationship between the supply fraternity and the railway men."

We by no means wish to have it inferred that we consider the same plan should necessarily be followed at the conventions of the American Electric Railway Association, but, as an indication of the desire of the steam railroads to avoid any criticism that they had overstepped the bounds of propriety, the incident is interesting.

RELIEF FOR THE NEW YORK SUBWAY SITUATION

The New York Court of Appeals has decided that the proposed subway contracts which the city is planning to make with the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company are not a violation of the State constitution, which wisely prohibits a municipality from lending its money, property or credit to a private individual or company and limits the obligations which a city is legally able to undertake. This decision, we hope, will remove the last obstacle to the signing of the franchises by which these two companies will begin the actual extension of their lines as proposed. We say we hope, because there have been so many slips in the past between the cup and the lip in rapid transit matters in New York that citizens of that city have come to believe that the cup is a very slippery one and about as far from the lips of the New Yorker as a third cup of coffee this year from those of a certain prominent candidate for the Presidency. Nevertheless, with the decision of the Court of Appeals and the announcement that the necessary financing by both roads has been completed, it seems much more possible to visualize the subways than ever before.

We have already indorsed the general plan which contemplates a division of the territory between the two companies interested and believe that such an arrangement, on the whole, will be far more beneficial to the city than if franchises had been given to one company to the exclusion of the other. As now arranged, both companies will reach the most important business sections of New York and Brooklyn, and these sections will be served by the Brooklyn Rapid Transit Company from the south and southeast and by the Interborough Rapid Transit Company from the north and northeast. There is practically no paralleling of tracks by either company except in this business district, and there the needs for rapid transit at present, not to speak of the near future, demand all of the lines proposed.

It is needless to say that such an extensive system could never have been built under the form of city assistance employed in the construction of the present subway. In that case the city advanced the money for the subway and elevated structure but took therefor a first lien on the property and received as interest on its money a sum sufficient to pay the interest which it had to pay on the bonds issued for the construction of the subway plus enough to retire the principal at the end of fifty years. Under such an arrangement the interest on the bonds takes precedence over every other charge. Under the new arrangement, however, the interest paid to the city and to the sinking fund to retire its bonds is not taken from the receipts until after the payment of operating expenses, including depreciation and taxes; then of a sum which has been agreed upon to represent the profits which the companies would have made in their present properties if they had not been extended, and then of interest at 6 per cent upon the new investment made by the companies. After that the companies and the city share alike.

In passing upon the proposed contract the Court of Appeals expressly declined to discuss its wisdom, because it said that that was a matter solely for the consideration and decision of the officers of the municipality. Hence it passed upon the legal aspects of the question only. We do not believe, however, that the wisdom of such an investment of public funds will be questioned by anyone who has made a study of the transportation system in New York or has had any experience with it from residence there. Better transportation is a crying need, and to the city as a whole is worth, within reasonable limits, almost any sum. Without such form of preferential payment to the transportation companies the city could never have obtained anything approaching the transit facilities which it now will possess, and real estate valuations throughout all the boroughs should increase by leaps and bounds. The net result to the community as a whole from this development will be far greater than that which would be derived from any other investment of the city funds which has been proposed.

THE LARGER PROBLEMS OF ELECTRICAL SUPPLY

The chief matter of interest at the railway sessions of the Boston convention centered about Mr. Insull's paper on "The Relation of Central Station Generation to Railway Electrification." Mr. Insull's principles and practice in this matter are well known and successful, and the debate turned chiefly on the practicability of carrying these principles out in the general case of electrification. There seems to be no doubt that electrification about any large city is a thing which cannot be taken up by the various roads independently, if the most economical results are sought, but should be carried out by conjoint action of some sort. The traffic around any large railway center comes into a considerable number of radiating lines and presents very diverse requirements. In some way the several lines must get together and work out the problem of electrification for the benefit of all.

No one seems disposed to advocate haphazard independent action in this matter. On the other hand, some of the engineers who participated in the discussion held pretty strong views as to the possible advantage of over-consolidation. The broad question seems to be whether, given a large group of railways desiring electrification and a great central station already at work in the same territory and supplying power and light, railway electrification can be carried on more advantageously from a separate railway distribution system or from additions to the central station equipment. In other words, how far is it advantageous to go into unification of the generating system in such cases?

Several of the railway engineers present took the view that there was little advantage in a grand combined system after the railway requirements reached a certain magnitude. Railway systems do not present a material diversity factor, so that the total installation capacity must be substantially

the same however far consolidation is carried. Besides, in railway service there are great advantages in shifting the load from one plant to another in an interconnected system in which there is marked wandering of the load at various times. It has been already shown, and indeed is demonstrated by the admirable Chicago practice, that it is not desirable to concentrate all the generating plants of a great system under a single roof. The modern great network so strongly advocated by Mr. Insull is of such dimensions and character that it is wise to feed it from several points. This granted, one instinctively asks why, if a considerable group of cities is to be operated, there is likely to be any economic gain in taking upon these the railway load instead of relegating it to its own group of plants, since here too a single combined station is probably inadvisable. On a small scale there is great gain in obtaining electric power for railway use in a large and well-equipped central station of modern design.

On a large scale it is at least an open question whether the railway plants cannot produce power for themselves quite as cheaply as it can be provided by an outside plant. Experience in other cities than Chicago seem to bear out the view that given the requirements of power above a certain output, that power can be generated as cheaply by one organization as another, so that the railway has at least nothing to gain by going onto a general supply system. It is even possible that owing to the less severe requirements of regulation in a railway system it may actually generate its own power more cheaply than it can be furnished from a universal network. The difference in price between energy for lighting and for motor service, recognized by nearly all central stations, has for its basis, if indeed there be any basis save custom, the theorem that lighting regulation has to be so much better than power regulation that it is more expensive. *A fortiori,* railway power should be still less expensive and freed from the need of extreme precautions for regulation. A group of railway plants should turn out power for their own use more cheaply than anybody burdened with accurately regulated lighting service can do it for them.

This seems to be the attitude of railway engineers toward Mr. Insull's suggestions. The fact is undeniable, however, that where they have been tried these suggestions have worked extremely well, owing perhaps, as Mr. Stott suggested in the discussion, to the enterprise of Mr. Insull's company in combining in modern plants of a very high degree of efficiency the output of old plants in a more or less broken-down condition. Mr. Stott also disagreed wholly with the proposition that 50 per cent reserve is necessary in individual plants against 25 per cent reserve in combined plants. In his opinion a 10 per cent reserve in a thoroughly modern apparatus is ample. Difference of this kind leads to irreconcilable economic conclusions and in this deadlock the discussion was left. The diversity of opinion simply points out the hard fact that very little is known about the variation of economy in size in very large plants, and consequently the conclusions which are perfectly sound in dealing with moderate outputs may be quite the reverse when one considers the huge power demands of an electrified railway terminus.

ACCIDENT PREVENTION

At the annual meeting of the New York Electric Railway Association at Saratoga last week reference was made to the subject of accident prevention as the most important matter confronting managers in railway operation to-day.

It is a humane as well as a practical problem. So many complex conditions affect the expenses of all companies for injuries and damages that the results from year to year are not uniform with previous experiences, even where city operation is concerned, and it is not easy to decide what steps to take. It is much more of a task to estimate the possible losses from the greater hazard of interurban operation, where a single accident may precipitate bankruptcy. Certainly, however, the increased expense for this feature of operation demands the serious attention of the industry.

In considering the problem of accidents we start with the transportation department. We understand fully that it is very difficult for the transportation department to secure and retain a full complement of careful, reliable trainmen to operate the cars. In a large system it is a physical impossibility for a superintendent of transportation to be in very close touch with all of his men at all times. Only a crisis in operation, which may occur with some men in a month and with others not over once in a lifetime, will show clearly the real characters of some of the trainmen. In the meanwhile the superintendent of transportation must rely largely upon information and judgment, based upon conversation and observation, as to the fundamental nature of each human being upon whom so much responsibility for life rests. The superintendent of transportation is, as a rule, a man who has grown up with the property, so that he is thoroughly familiar with its details of customs, lines, employees, etc. This information is highly necessary in a street railway, and we do not see how it is possible under ordinary circumstances for a company to accomplish the most successful results with its employees without securing in some way the impartial benefit of that intimate knowledge which can come best from men who have risen in the ranks. Great pains are taken to cause the trainman to reveal the condition of his physical being. As some of the speakers at the Saratoga meeting suggested, however, more pains should be taken to determine whether a man's senses of sight, color and hearing are normal.

Although signal tests employed on many roads and the conversation of the examiner when the application is made are really mental soundings, the question of positive mental alertness is generally considered by operating managers to be one apart from the usual physical examination of the trainman. The problem is not whether the superintendent of transportation is the official best equipped to deal with the men on behalf of the company, but whether in some way the examination and the tests of mental alertness of a man can be carried further than has been the practice in the past. So far as the examinations of the trainmen have been conducted in the history of the industry up to this time, they have represented the tests that were possible with the knowledge of conditions prevailing. With the unfortunate accidents that have taken place and the increasing cost to the companies, managers have naturally begun to seek new and better methods. If such methods cannot be

introduced through the system now prevailing in the transportation department, perhaps they could be developed as supplemental to present practices. Further investigations by the companies should indicate the practicability of other tests.

Another respect in which we would introduce methods that have not been followed by all of the companies in the past is in the attitude toward claims and cases that reach the courts. After a company has been so unfortunate as to have an accident, and until the degree of its responsibility for the act is determined, the matter passes to the jurisdiction of the claim agent and attorney. Formerly the practice of some companies was to let cases go to the courts and await settlement there. The more advanced practice which has been found on various properties to lead to the most satisfactory results from every standpoint is to settle claims and cases promptly and prevent an accumulation of uncertain liability for the future to meet. Enlightened practice of this kind is based on a belief, first, that it is more economical to settle cases promptly than to let them drag through the courts and is fairer to the claimant, because it eliminates at least partly the expense of his lawyer and tends to bring the individual into direct contact with the company, and, second, that it reduces the hostile feeling which develops in the community when cases, no matter what their merits may be, are contested rigorously.

Actual costs differ widely. When the costs of accidents and damages of one property are compared with those of another the basis of comparison is usually the percentage of gross operating revenue expended for this purpose. Companies generally are unwilling to show the division of costs as between settlements out of court and judgments. It is perfectly plain, however, that the percentage of actual payment in the accounts of one year bears no acceptable relation to the possible percentage of liability. A company may cause cases to be thrown into the courts which will involve eventually a cost greater than the percentage of revenue actually disbursed during the year. It is for this reason that no provision by a company for the cost of its injuries and damages can be considered reasonably complete unless there is a definite reserve for accumulated liability.

If a comparison between two properties in respect to payments for injuries and damages is to be fair, it must take into account, as Mr. Duffy remarked at the Saratoga meeting, differences of laws, prevailing ordinances, conditions of streets, etc. The United States Census report, covering the operations of substantially all the properties in the country, offers for these reasons no acceptable basis of comparison with an individual property. It does show, however, the average result in the entire country. The cost of damages and legal expenses incidental thereto for the 939 operating companies reporting in 1907 was 7.2 per cent of the total operating expenses, or 4.3 per cent of the total operating revenues. In 1902 the corresponding cost of the 799 reporting operating companies was 6.6 per cent of the total operating expenses, or 3.8 per cent of the total operating revenues. These figures, however, are appreciably smaller than those that were presented in the census report for thirteen selected companies, including the former Boston & Northern system, the companies in Brooklyn, Cincinnati, Cleveland, Philadelphia, Pittsburgh, San Francisco, Baltimore, St. Louis, Buffalo and the surface properties in Chicago. These companies paid in 1907 for damages and legal expenses incident thereto a total of 9.4 per cent of their operating expenses as compared with 9.1 per cent in 1902.

A company owes it to the community to operate with as few accidents as possible. When we consider the possibilities of loss of life and the direct relation between the expenses arising therefrom and the character of trainmen, it is apparent that a great responsibility rests upon the officials who have charge of the selection of platform men.

SYSTEMATIC LINE MAINTENANCE WORK

Methods employed in the maintenance and operation of the overhead system are undergoing improvement. The work as a whole requires hardy men and strong tools; often it has to be handled at the cost of traffic delays, under the most severe weather conditions, and by methods adapted to the immediate situation. Quick results are demanded constantly and great irregularities exist in the requirements placed upon crews in the field. The controlling factor is the maintenance of car service rather than the cost of standard jobs.

Notwithstanding these obstacles to economical administration, practices in progressive companies are being bettered. More attention is paid to records of service defects, their causes and the cost of maintenance. Curves showing the relation of breaks in trolley wire to time and weather conditions are plotted and analyzed; weak spots on the system receive complete inspection more frequently, and greater care is taken to test the overhead work in certain cases by the use of artificial loads in the study of wire elevations and deflections. Particular efforts are made to secure regular measurements of wire diameter by micrometer gages, more thorough inspection is made, and the results of an examination of a given span are brought more quickly to the attention of emergency repair forces.

In some localities where the density of traffic is so great that interruptions of service cannot be risked even for a minute or two, the wearing sections of the overhead system are replaced regularly after a given number of months' service without regard to the cross-section of wire existing. Greater attention is given to the occurrence of loose fits in the overhead structure and to the effect of a specific strain upon poles, brackets and other equipment.

Opportunity exists frequently for the improvement of line department work in connection with the manufacture of metallic fittings, the centralization of stores, construction of special work cars and systematic handling of scrap and reclaimed material. More careful records of average life of service of anchors, ears, frogs and other fittings would tend to reduce the quantity of spare parts carried. Lists of standard fittings in blueprint form are useful and should be kept up to date as designs are changed. In some cases the line department has not been provided, as it should be, with good quarters, adequate storage facilities and labor-saving machinery. Further improvement in both the planning and the execution of line repairs and construction should be encouraged by all companies.

Submarine Power Cable Installation at Sacramento, Cal.

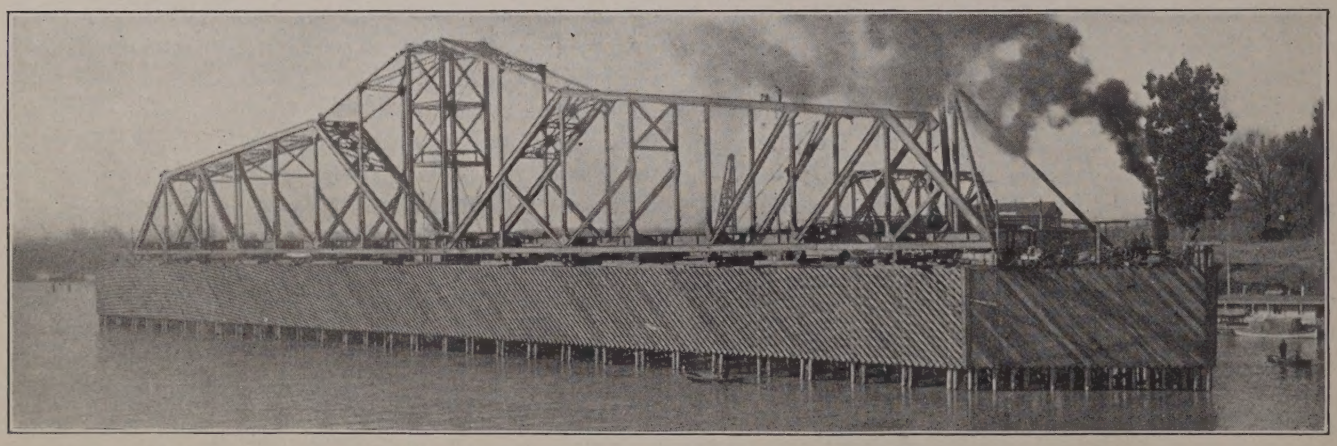
The Cable Transmits Power Across a River and Also to the Draw Span of a Bridge Which Is 650 Ft. Long—The Method of Laying It and of Making Connections Is Fully Described

BY J. PAULDING EDWARDS, ELECTRICAL AND MECHANICAL ENGINEER NORTHERN ELECTRIC RAILWAY

A submarine cable installation of some importance was made March 12-16, 1912, by the Northern Electric Railway, Chico, Cal., immediately adjacent to the new steel drawbridge which has been jointly installed across the Sacramento River at Sacramento, Cal., by the Northern Electric Railway, the Vallejo & Northern Railway and the counties of Sacramento and Yolo.

The bridge is a combination railroad and highway structure, having a single-track railway in the center with 16-ft. clearance, two roadways with 11-ft. clearance and two walkways with 4 ft. 6 in. clearance. It is built entirely of steel with concrete piers. The structure consists of two 125-ft. fixed spans and a 400-ft. draw span. The loading is Cooper's E-40 for the railway portion.

The apparatus at hand for the laying of this cable was a barge, which had been used for the erection of the steel, and the ordinary gear, consisting of a donkey engine, boom chains, lines, blocks, etc., provided for this purpose. The only special gear used in the installation of the cables was a reel rack and a special chain bridle with a 4-in. shaft spindle upon which the reels were placed. The spindle was used as a shaft for rotating the reels while paying out and also for lifting the reels through the span rest in the center of the river.



Cable Laying—General View of 400-Ft. Draw Span

CABLE SPECIFICATIONS

The cable consists of two 650-ft. lengths of 1,500,000-circ. mil copper. It was made by the Safety Insulated Wire & Cable Company, Bayonne, N. J., and tested by J. G. White & Company, New York, in accordance with the following specifications:

"General.—These cables will be used to carry current at a normal working voltage of 650 volts and with a possible maximum working voltage of 1500 volts, direct current. All workmanship and materials shall be first class and the best of their respective kinds and shall be in full accord with the best modern electrical and mechanical engineering practice.

"Conductors.—The cable shall be composed of ninety-one strands 0.1284 in. in diameter. Each conductor shall be of soft-drawn annealed wire, having a conductivity of not less than 98 per cent pure copper, Matthiessen standard, shall be continuous throughout its length and shall be provided with a heavy uniform coating of tin without burrs or fins.

"Insulation.—The wires shall be insulated with a vulcanized rubber compound containing not less than 30 per cent nor more than 33 per cent, by weight, of the finest dry Para rubber which has not previously been used in rubber compounds. The gum itself shall not contain more than 3½ per cent resinous extract. The vulcanized rubber compound shall contain not more than 5 per cent, by weight, of acetone extract and not more than 1 per cent of free sulphur. The insulation must be tough, elastic and homogeneous and placed concentrically about the cable, thickness not to be less than 9/64 in. at any point.

"Taping, Braiding and Armoring.—Cables are to receive taping, braiding and armoring as follows: Taping, 4/64 in. in thickness, next to the rubber insulation; this taping to be of closely woven cotton filled with a neutral rubber insulating compound. The exterior of the finished taping shall present a smooth surface, concentric layers of tape to be wound in opposite directions.

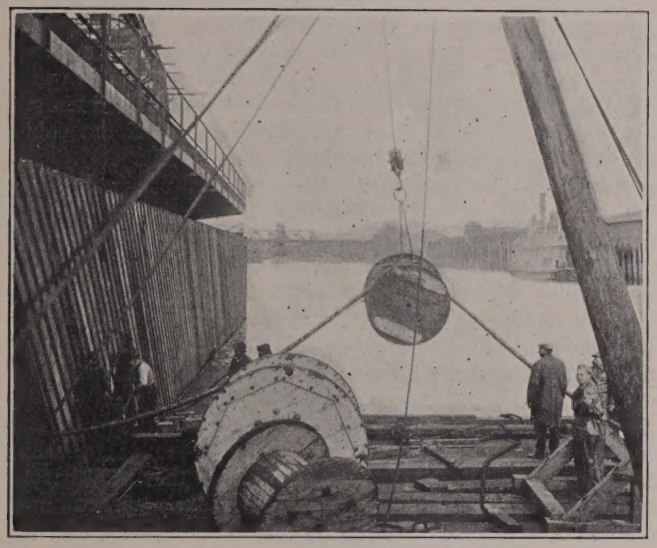
"Plain lead, 9/64 in. minimum thickness, next; to be absolutely free of imperfections, which would jeopardize its efficiency in affording a perfect coating impervious to moisture, and to be of such malleability that no mechanical injury will be sustained by it when handled with ordinary care.

"The 8/64-in. jute, to be of eight-ply throughout, thoroughly impregnated with a neutral waterproof and insulating compound that will remain semi-plastic indefinitely; this jute to be spirally applied over the taping. The impregnating material used shall not suffer any injury itself or occasion any injury to the adjacent materials when at or below a temperature of 200 deg. Fahr.

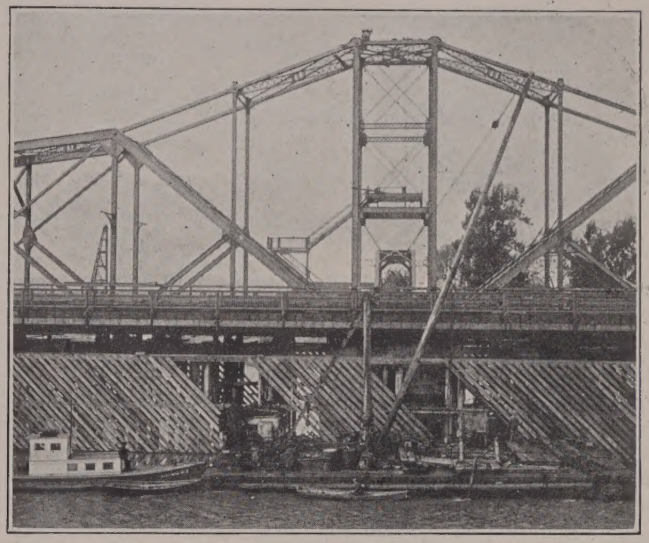
"Armoring to be two concentric galvanized steel wire sheaths wound in opposite directions as follows: One layer of No. 8 galvanized steel, diameter 0.134 in., one layer of No. 4 galvanized steel, diameter 0.203 in., and an outside serving of 8/64-in. jute, impregnated as before specified for jute and given a sand and lime finish.

"Tests.—The insulation resistance test shall be made up-

on the wire after twenty-four hours immersion in water and before the tape and hemp are applied. The high-potential test voltages as per accompanying table shall be applied for the periods specified. The insulation resistance shall be such that neither the cable nor the insulation will



Cable Laying—Cable Threaded Through Small Reel Preparatory to Being Dropped off End of Barge

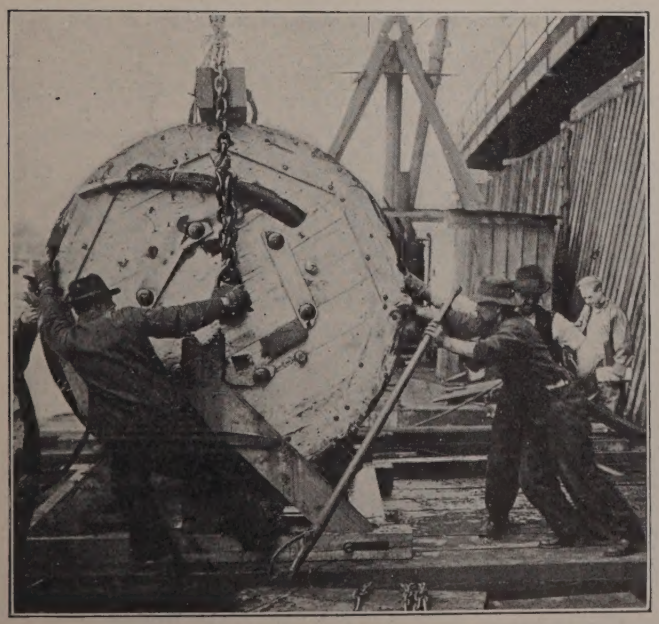


Cable Laying—View Showing Openings in Draw Rest Protection Through Which Cable Reels Were Passed

sustain injury of any nature whatsoever due to the application of test voltages as specified.

At Factory		After Installation	
Minutes	Volts	Minutes	Volts
5	5,000	5	4,000
30	4,000	30	3,200
60	3,200	60	2,500

"A sample of the vulcanized rubber insulation 1/16 in. thick and about ½ in. wide, not less than 4 in. long, shall have marks placed upon it 2 in. apart. The sample shall then be stretched until the marks are 6 in. apart and at once released, and in five seconds after such release the marks shall not be over 2⅜ in. apart. The sample shall



Cable Laying—Dropping Cable and Reel (Weight 15,000 Lb.) Into Reel Rack

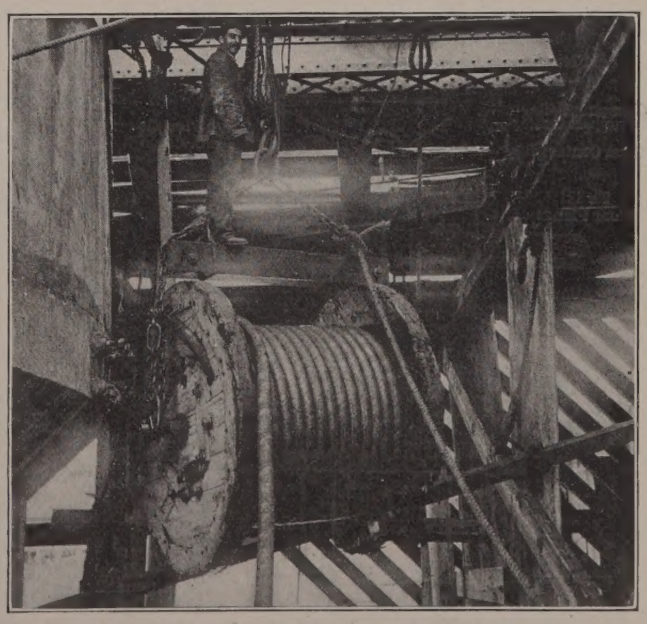
then be stretched until the marks are 8 in. apart, and in five seconds upon release the marks shall not be over 2½ in. apart. Any sample may be stretched until the marks are 9 in. apart before breaking and must have a tensile strength of not less than 800 lb. per square inch.

"Inspection.—Cables furnished under these specifications shall be open for inspection by the engineer during the entire process of manufacture, and the contractor shall afford every facility to the engineer for making such inspection. The contractor shall notify the engineer when the manufacture of cable is to begin so that inspection may be arranged for."

The sectional drawing on page 8 was a part of these specifications.

ELECTRICAL AND MECHANICAL CONNECTIONS

The cable, while laid in two lengths, will ultimately be divided into four sections, the combination of sections being made possible by means of switch boxes located two on the center pier and one on each of the span rest piers. The arrangement is such that in the event of a failure of any one of the four sections the defective section can be temporarily eliminated from the system and the ground re-

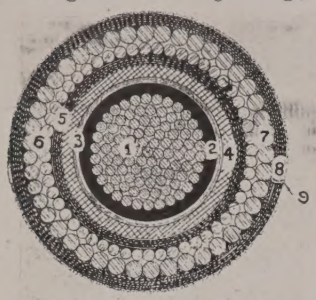


Cable Laying—Reel Suspended to Center Pier Anchorages While Barge Was Moved to Yolo Side of Span Rest

turn during the interim of repairs on this section will then be carried through the traffic rails laid on the bridge. Positive and negative taps are taken out from the center pier switch boxes for the operation of turning motors, lifting motors and lights, as well as for the operation of a

vertical, centrifugal pump of a capacity of 600 gal. per minute at 100 lb. pressure, which will be installed for fire protection.

As provision had to be made for rotating the draw span through an arc of 300 deg., it was necessary to bring both



KEY.

1—91 wires 0.1284 in. diam., 98 per cent copper, all wires tinned.
2—99-64 in. 30 per cent Para rubber insulation.
3—4-64 in. tape.
4—9-64 in. plain lead.
5—Jute.
6—No. 8 galvanized steel wire, diam. 0.134 in.
7—No. 4 galvanized steel wire, diam. 0.203 in.
8—Jute serving with.
9—Lime and sand finish.

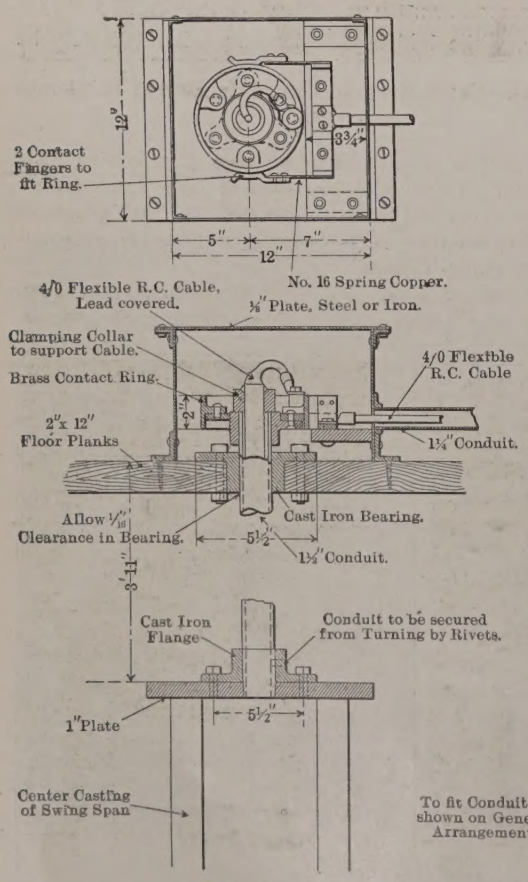
Jute impregnated with a neutral waterproof insulating compound that will remain semi-pastic indefinitely.

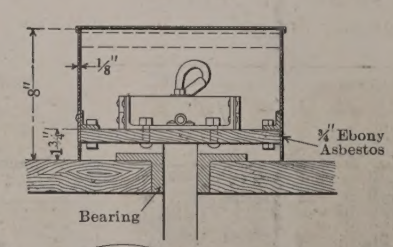
Cable Laying — Section of Cable

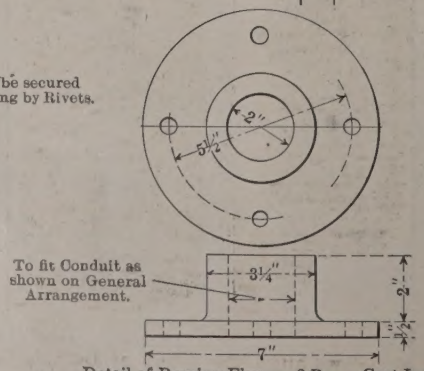
the hydraulic and electrical connections to the center span through the center of the movable span-bearing quill. A hydraulic expansion joint is used for this purpose, the power lead being brought through the center of the hydraulic pressure pipe in conduit to a collector device, the details of which are shown in one of the accompanying drawings.

The negative connection for the electrical system of the center span is directly from the main rack of the bridge drive to a jumper in one of the switch boxes.

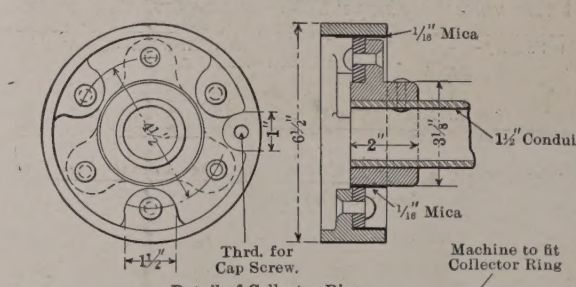
Cable clamps 18 in. long were provided to anchor the cables to the piers. In each case these clamps are supported by four steel stud bolts 1¼ in. in diameter, which were set into the concrete piers 2 ft. 6 in. The details of these clamps are shown in several halftone illustrations. The corrugations shown on the interior of these clamps fit snugly about the outside armor sheath of the cable.



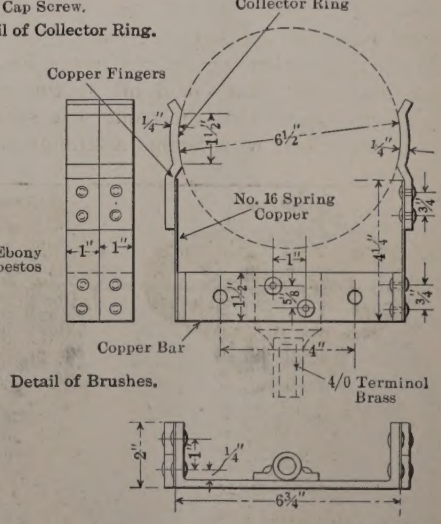




Detail of Bearing Flange, 2 Req., Cast Iron.



Detail of Collector Ring.



Detail of Brushes.

Cable Laying—Collector Device for Saco-Yolo Bridge

INSTALLATION.

The reel and rack were set up on the barge previously mentioned about 10 ft. from the edge. The barge was then anchored approximately 40 ft. from the up-stream side of the Sacramento shore pier. Using the boom of the derrick, a line was passed behind the dolphin protection (cluster of piles) and underneath the bottom sill of the diagonal sheathing. This end was then brought up on the barge and about 30 ft. of length was made fast with hemp bindings, spaced 3 ft. apart, on the end of the cable. The cable was then paid off simultaneously with the taking in of the boom line on the donkey. About 100 ft. of cable was taken off in this manner. The wedge block brakes were then inserted underneath the edge of the reel and the first end of the cable was lifted into position on the pier and clamped. This first operation occupied about one-half day.

Two lines were then taken from the barge. One was made fast on the up-stream nose of the span rest and another, on the Sacramento shore side, was attached to a wharf pile. By taking in on the line attached to the pier rest and paying off proportionately on the line attached to the wharf on the Sacramento side the barge was warped directly across to the opening in the span rest immediately adjacent to the center pier. A small tug was used to pull diagonally on the barge during this and subsequent operations to assist the movement across the stream. The cable was allowed to run freely from the reel so that at all times its position as it left the barge would be nearly vertical, and a dolly was placed at the point where the cable left the barge. In this way the cable was laid on the bottom of the river without any strain other than the weight of the cable itself between the barge and the riverbed.

Using the donkey and boom, together with the chain bridle, the reel was then lifted and passed overboard. Gear had previously been rigged immediately under the center of the draw span so that the reel could be lifted in a position which would bring the cable immediately adjacent to its clamps on the center pier. Double blocks and a 6-in.

manila line were used; while the boom lift was paid off the inside tackle was taken up, utilizing a winch sheave on the donkey, and the cable on its reel was landed adjacent to the top of the center pier. All lines were made fast and the boom gear then taken aboard the barge. The barge was then shifted around to the Yolo side of the span rest, and, utilizing the same method that had been employed to land the reel in the center, the reel was again placed in its rack on the barge. Prior, however, to this an empty reel of a size around which the cable could be bent without injury was threaded through the cable. This reel was elevated into position and made fast. Accompanying illustrations show the cable reel fast in the center and the spare reel finally made fast with the cables lying adjacent to their clamp studs. Sufficient slack was paid off so that the cable would lie vertically from its clamps to the bed of the river.

Again utilizing the system of lines which was used on the

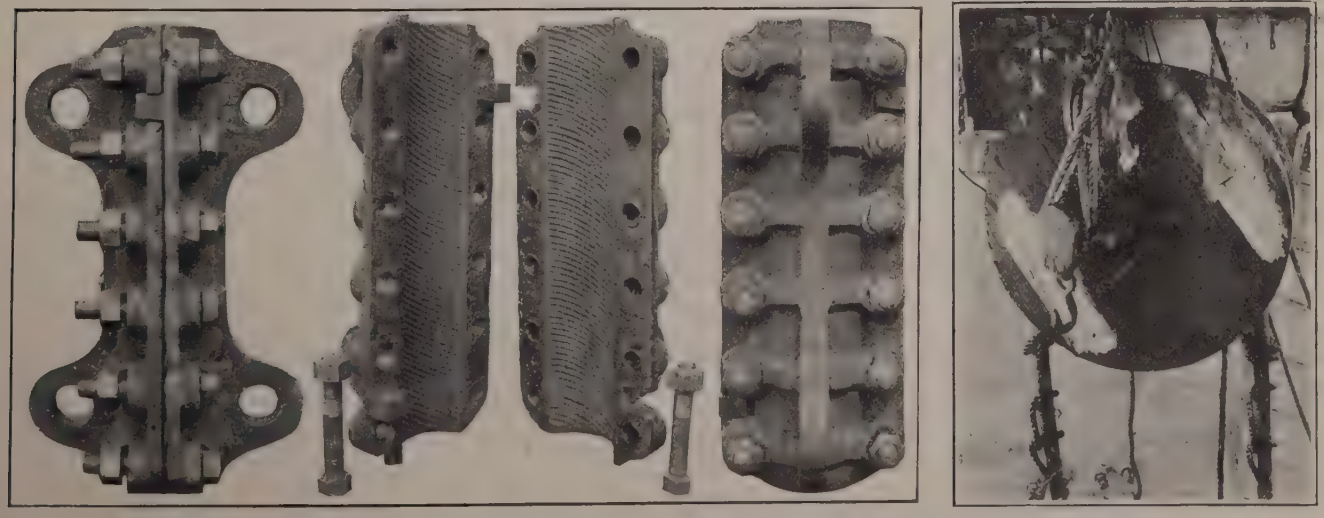
Cable Laying—Lifting the Cable on the Loose Reel to Secure the End

Cable Laying—Cable End on Yolo Side Shored in Clamps on Pier

Sacramento side of the span rest, the barge was moored alongside of the pier on the Yolo side. Another spare reel was then passed underneath the cable, which was bridled and taken up on the barge boom, the cable from the main reel being paid off as the reel was lifted. In this way the end of the cable was secured, an extra line was made fast with hemp fastenings and the end was elevated into position in its clamp. One illustration shows the cable finally clamped on the pier.

This left a large loop of cable suspended from the boom reel overhead. The tug was sent upstream immediately above the barge and by lowering the boom this loop of cable on the reel was lowered on the aft deck of the tug. The bridle was then removed, all lashings were taken clear, the reel was tipped over and the cable was allowed to drop overboard. The purpose of this extra loop was to anticipate additional scouring of the river, the bed being very changeable at this point. The final condition is such that, while this added length of cable is not required immediately, it lies in the stream adjacent to the pier and will gradually pay out in the event of such scouring without bringing any strain on the cable clamps.

The downstream cable was laid by utilizing the same methods as were employed on the upstream cable, the return trip occupying one day less time than was required for the installation of the upstream cable. As it had been determined by the laying of the upstream cable that the anticipated scouring had not taken place, the return cable was laid slightly looped down stream on both sides of the



Cable Laying—Clamps, End and Side Views and Open Loop at Left of Center Pier Anchorage

span rest. This method worked out to a nicety, as the final end of the cable on the Sacramento side fitted into its clamp with just the requisite 5 ft. of cable above the pier top.

The cable was laid under the direction of the Northern Electric Railway, and there were present also representatives of the manufacturers during the entire work. After the clamps were in place the cables at the center pier were cut, and pot-heads of the open-air type were installed.

In addition to the power cables, there was laid also a ten pair No. 16 copper-covered, armored telephone cable. This cable was laid from the shore abutments, and a loop was brought up at the center pier for the installation of a junction box to facilitate testing and also so that telephone leads could be brought to the bridge tender's house on the center pier.

Tests have not yet been made on the cable, but no trouble is anticipated in view of the care exercised in its placing.

THE BOSTON STRIKE

Normal service has been maintained well during the last week by the Boston Elevated Railway, despite sporadic outbreaks which have occurred at times in localities where strikers and sympathizers have assembled in numbers. The company has adhered consistently to its policy of refusing to treat in any way with outside interests devoid of responsibility for its relations with its employees and the public, and has co-operated with the officers of the law in doing everything possible to provide safe and efficient transportation on all parts of the system. Disorder has been quelled with little delay and the courts have continued to impose significant jail sentences rather than fines in the great majority of cases where arrested persons have been found guilty of turbulent conduct.

Trouble broke out afresh on the evening of June 29, following the close of a mass meeting of strikers at the Grand Opera House. A number of attacks were made on cars in the South End and Dorchester districts. Stones were thrown at the cars and police and loyal employees were assaulted. Through the co-operation of the railway company flying squads of patrolmen were mobilized at points of disturbance by the aid of the telephone and automobiles, and the rioters were obliged to disperse after a short time. Attempts were made to derail cars in a number of instances, when gas pipe and other obstructions were placed on the tracks. Through the vigilance of motormen and inspectors many obstacles have been discovered in time to prevent trouble. An unsuccessful attempt was made to dynamite a car near the Harvard Medical School. All neighborhoods of doubtful reputation are watched closely by the police for suspicious characters, and the police have acted promptly when action has been necessary. In some cases it has been necessary to preserve order with drawn revolvers, and in the rioting on June 29 one disturber was wounded, perhaps fatally, by a bullet after repeated warnings from an officer who was protecting a car from the assaults of a large mob. With this possible exception, not a life has been lost since the strike was started on June 7.

During the afternoon of July 2, in accordance with a prearranged plan of the strike organizers, a demonstration was made in the afternoon in front of the State House on Beacon Street, Boston, with the avowed object of enabling the State Board of Arbitration and Conciliation, which is investigating the strike, to determine the actual number of former employees participating in the walkout. Organizer Fay, the ringleader of the strikers, issued a statement claiming that 4000 men would appear in front of the capitol at the appointed time, but careful counts showed that not over 800 uniformed men were on hand, with perhaps 500 sympathizers and spectators in citizens' clothing. As a result of a conference with Acting Governor Robert Luce, the gathering was not allowed to enter the State House, and portions of the riot act were read to the strike leaders by the Acting Governor, who pointed out that the entrance of such a body of strike partisans would disorganize the business of the various state departments seriously and establish a precedent which might have highly undesirable results. This position was taken after a conference with Chief Whitney of the Massachusetts District Police and Acting Sergeant-at-Arms Nosman.

In a statement issued during the afternoon, the Governor pointed out that in such cases it is highly important to take into account the psychology of a crowd and to remember that the history of many such gatherings has shown that men who individually would never think of being other than law-abiding citizens are often carried away by extraordinary impulses when they become a part of a large body. It was further stated that no gain in the procedure of the hearings by the state board would be accomplished by the entrance of such a delegation. The board may conduct the inquiry under the statutes in any way that it sees fit. It is not required to hold a public hearing, and if it so desires, it may hold its investigations entirely through agents. If it thinks a hearing would be of use, it may examine such witnesses as it chooses, or it may issue a general invitation to anyone desiring to be heard. In this instance the board has issued no such general invitation, and all witnesses have been present, so to speak, on sufferance. The Governor said that while the board was quite willing to listen to anybody who could present any pertinent information, the presentation of testimony by a great number of persons would result in an enormous amount of repetition and delay the conclusion of the investigation far beyond the time when in the interests of all concerned it should be reached.

At the close of the demonstration, the strikers paraded to the Wells Memorial Building, where a mass meeting was held. Following this, rioting took place in the streets outside the hall and a large number of cars were attacked. One hundred police reserves were rushed to the scene and in a short time order was restored. Many persons were arrested, and those convicted of throwing missiles each received sentences of six months in jail. Fines of from $5 to $10 were imposed for placing minor obstructions on tracks, cutting trolley cords and similar disorderly conduct. Up to July 3, 108 former employees of the company had been arrested for strike disturbances, and of these ninety-one had been found guilty despite the assertion of the strike leaders that disorder and violence are deprecated.

On July 4 the company had the situation well in hand and maintained a full holiday schedule. A rumor was circulated by the strike leaders on the evening of July 3 that the surface car service would be suspended during the night and on the holiday, as a precaution against further trouble. The company met this canard by keeping every scheduled car on the system at work and, with the cooperation of the police, found the evening to be the quietest night before the July 4 holiday for years. On the holiday itself a heavy traffic was handled with complete success. It is expected that the hearings given the strikers by the State Board of Arbitration will be terminated early next week. Thus far it has been unnecessary for the company to appear in the hearings, and public sentiment continues to support its position on every hand.

Considerable notice is being given at present in Great Britain to a scheme proposed by Sir William Ramsay by which it is planned to stop the mining of coal. Instead, holes will be bored from the surface to the veins of coal. Then by igniting the coal and supplying a limited amount of air through some of the bore holes, producer gas can be obtained through adjacent vent-holes. It is reported that the new method will soon be tried at an English colliery.

ADVERTISING FOR TRAFFIC IN LONDON

Several articles have been published in past issues of the ELECTRIC RAILWAY JOURNAL describing the elaborate system of poster advertising and traffic bulletins used by the London United Underground Railways. As these methods have proved so very satisfactory for increasing traffic, it may be of interest to mention some of the work done during the past winter and spring.

In order to encourage travel during the winter, posters of two classes were designed, one showing the possibilities of outdoor pleasures, such as pleasant walks through certain villages and ice skating, and the other showing notable displays in the British Museum and other public buildings. With the advent of early spring, posters of special interest to the fisherman and nature lover were prepared, followed by announcement of the flower displays at various public conservatories. A poster of permanent character is one giving a list of the names, conditions of admission and location of public art collections, public buildings, churches and chapels, parks, hotels, restaurants, railway terminals, concert halls, educational institutions, theaters, sporting grounds, historic buildings, monuments, charitable buildings and principal stores. This poster is accompanied by the usual map showing all the stations mentioned in the directory.

A rather novel set of posters, which unfortunately cannot be reproduced, consists of a series of maps which show the comparative advantages of different suburbs. Each poster presents the physical features of a given locality, the location of the buildings, parks, etc. A statement of the local rates for taxes, gas, water and electricity is printed over the name of each community. In addition, one corner of the poster announces the season ticket rates to the several places named, as well as the running time. In this way the prospective suburbanite can see at a glance the character of the suburbs and the comparative cost of living therein.

Several other posters are reproduced in the accompanying illustrations. One of these shows several Greek gods who are represented as typifying the qualities of the London United Underground Railways as follows: Charon for cheapness, Pan for countryside, Hermes for speed, Eros for pleasure, Chronos for punctuality, Pallas for safety and Pluto for underground travelers. The saving of time over a given route by the way of the underground line is ingeniously shown by the hourglass poster. The country poster is one which cannot fail to attract the lovers of children. The fourth poster, which is a clever pun

A Poster for the Lover of the Classics

entitled "Underground for Safety," represents a cave man fleeing to his subterranean den to avoid an antediluvian monster which was created for the occasion by one of the imaginative artists of the company.

During the first week of 1911 the company began the publication of a bulletin which features a different traffic topic each week. One bulletin, for instance, has a discussion on famous paintings in London and states where they are on exhibition. A bulletin which was issued during the winter shopping season shows many pictures of children's toys to accompany the Christmas spirit of the text. A third bulletin tells about the latest changes in the Zoo, while others are devoted to the theatrical hits of the day. Thus the traffic bulletin takes up whatever subject is likely to be uppermost in the minds of the public. These bulletins supplement the standard bulletins which carry announcements regarding services at different churches from week to week, the locations and study periods of schools, etc.

Posters for the Children-Lovers, the Mathematicians and the Cautious

The Relation of Central Station Generation to Railway Electrification*

The Author Presents Data to Show the Advantage of Centralized Power Supply, with Particular Reference to Chicago —A Report of the Discussion on This Paper Is Included

BY SAMUEL INSULL, PRESIDENT COMMONWEALTH EDISON COMPANY, CHICAGO

The problem of the relation of the central station to the generation and primary distribution of energy, so far as the steam railroads are concerned, is a question of economics. It cannot properly be considered without taking into account the entire question of generation and primary distribution for any given center of population. If you consider steam railroad electrification by itself, the amount of energy required seems to be very great indeed. If you consider it merely as a fraction of the supply of energy by a community for all kinds of purposes, it is found to be simply an incident. Perhaps a more accurate title for this paper would be "The Generation and Primary Distribution of Energy for Given Areas," because that is the real question involved.

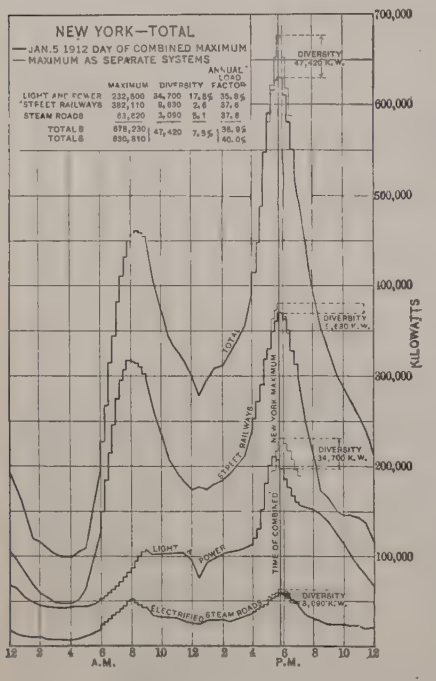


Fig. 1—Public Service Electrical Requirements, New York

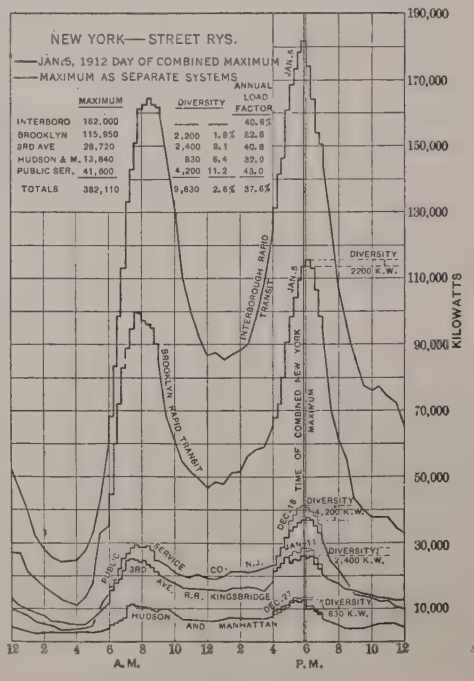


Fig. 2—Electric Railway Loads in New York

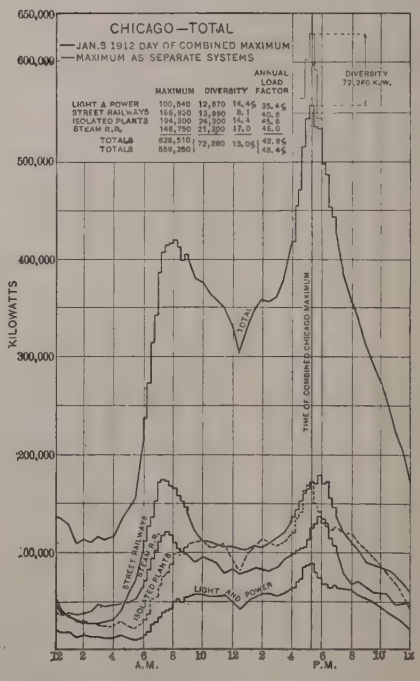


Fig. 3—Electrical Requirements of Chicago

I have come to the conclusion that the concentration of the production of energy, for all purposes required in a given area about any large center of population, would result in such a saving in capital and such a saving in operating expenses as to provide sufficiently for the generating capacity and primary transmission systems necessary to electrify the terminal systems and suburban service of all the trunk lines centering in and around that center of population (particularly is this true of New York), and such a saving as to yield very large profits, in addition, to the engineers and financiers having the courage to handle so great a problem.

The percentage of saving is comparatively small. On a percentage basis I may say that the percentage of saving in Greater New York, and in "Greater New York" I include that part of the Jersey shore that would naturally be considered a part of a Greater New York, is comparatively small, and to my mind somewhat disappointing, owing to peculiar conditions which I will explain later. But the saving itself is so large and amounts to such a vast sum of money, capitalized, that I cannot see how either the engineers or the financiers can neglect the subject and let it pass by.

To take up now the illustrative curves, Fig. 1 is the New York total load diagram. It includes the present electrical load of the central stations in Greater New York and the central stations on the Jersey shore, within a radius of 10 miles or 12 miles of New York, operated by the Public Service Corporation of New Jersey, and the station of the Hudson & Manhattan Railroad Company. The diagram includes only that portion of the load of the electrified steam roads which has already been electrified and does not include an estimate of the load of the isolated plants. If the rest of the load of the electrified steam roads and the isolated plant load were included, the total would be about 1,000,000 kw.

Looking ahead, if you take this New York maximum of 676,000 kw and apply an 8 per cent annual increase (the actual increase of this maximum over the previous winter was 7½ per cent), at the end of eight years the New York maximum would amount to 1,250,000 kw, and at the end of ten years to 1,480,000 kw. If there is added to these figures the isolated plant and steam railroad demand, it makes about 1,000,000 kw of load at the present time. The steam railroad demand would be about 170,000 kw of that total, and the demand made by isolated plants would be 217,000 kw.

*Abstract of a paper presented at the twenty-ninth annual convention of the American Institute of Electrical Engineers, Boston, Mass., June 26, 1912

The total load of the systems separately is 678,000 kw, and there is a diversity factor that would reduce that if they were all run as one system; that is, if the present business of the lighting and power companies, the street railways and the steam railways were combined, the maximum load this last winter would have amounted to 630,000 kw, or a saving of upward of 47,000 kw. The diversity factor amounted to 7.5 per cent, and the load factor would have been improved from 36.9 to 40 per cent.

Fig. 2 shows the load diagram of the electric railways of New York City. The Interborough Rapid Transit Company has much the largest maximum of all of the New York companies, and therefore establishes the day and hour of the combined maximum, and there is no diversity between the Interborough load and the combined maximum. The diversity between the three power houses, subway, surface and elevated, of the Interborough has not been taken advantage of, and possibly amounts to a considerable figure. What is meant by that is that I have not taken advantage of it in making these diagrams, because the interests having charge of the street railways, I believe, have already taken advantage of it by connecting up their various power houses, so as to get the advantage of the diversity factor.

Fig. 4 shows the load diagram of the steam railroads entering New York City. Owing to the electric heating have been 95,400 kw, instead of 111,200 kw, as there is a diversity of 16.5 per cent between the two businesses.

Fig. 3 shows the total load diagram for Chicago. The diversity shown in the tabulation on this chart amounts to 72,260 kw, and would require, assuming a 25 per cent reserve, 90,300 kw more capacity if operated as separate systems than if operated on a combined generating system. At $75 per kw this amounts to an extra investment of $6,772,500. On account of the diversity between the different isolated plants, it is assumed that their load factor, if combined, would be equal to the load factor of the Commonwealth Edison Company's general light and power business, that is, 35.5 per cent.

The increased investment necessary as between these systems being operated all as one, including steam railroads, and being operated as separate systems, taking the cost of generating plant plus the cost of the primary transmission system, would mean an expenditure of upward of $10,000,000 to $12,000,000 more than if the work is done on one system. We have got reasonably well started in Chicago toward doing it on one system. We have practically the most important part of the work, that is, the street railway work, and we are trying there to do all we can to get the isolated plants out of existence. Although Chicago is the greatest steam railroad center in the United States to-day, the amount of energy required for operat-

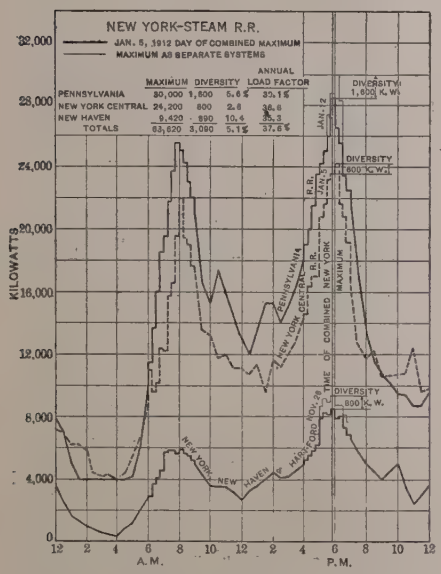


Fig. 4—Steam Railroad Maximum Loads, New York

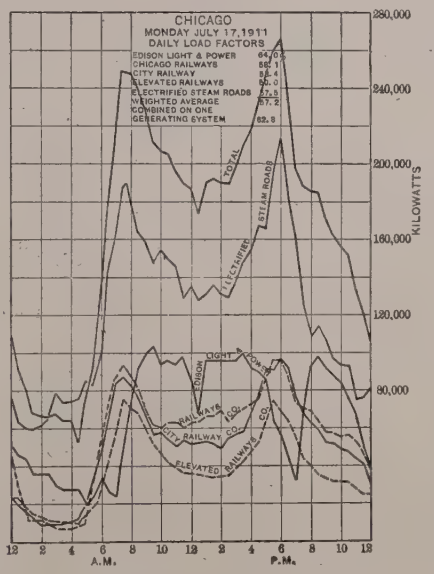


Fig. 5—Loads and Load Factors of Chicago

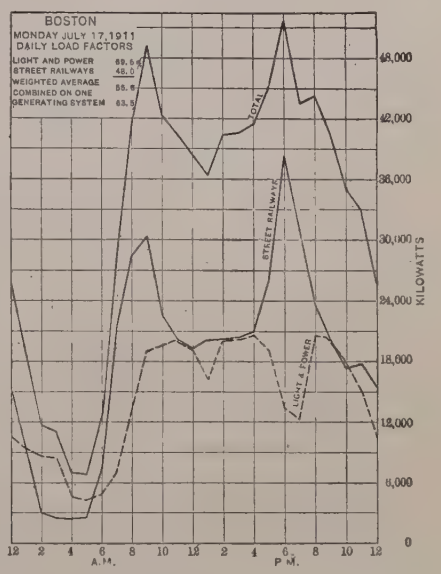


Fig. 6—Loads and Load Factors of Boston

of the suburban cars, the New York Central maximum occurs on the same day as the Interborough and the combined maximum, and the Pennsylvania maximum, for the same reason, only a few days later.

The present electrical load for the passenger service of the steam railroads of New York is estimated at about two-thirds of the total load if all of the passenger service within a reasonable radius of say 15 miles to 20 miles of New York City were electrified. This would give for New York a total electrified passenger load of 95,000 kw, as compared with our estimate for Chicago of 73,000 kw, which appears reasonable. If to this we add 75,000 kw for freight, as compared with our estimate for Chicago freight of 78,000 kw, we get a total for the electrified steam railroads in the vicinity of New York of 170,000 kw. Attention might be called to the fact that the farther out the steam railroads are electrified the less influence the suburban service will have and therefore the greater the diversity factor.

There is a remarkable diversity between the loads of the street railway and lighting and power companies in Boston. If the service for both the lighting and railway were run by the same station, the maximum load last winter would ing all of the terminal systems there is so small a percentage of the whole that it would seem unreasonable to think we will not be able to get that, as well as the business of the surface and elevated railroads.

Fig. 7 shows the load diagram of the electrified steam railroads of Chicago, assuming that the steam railroads in the vicinity of Chicago are electrified some time. It is a load diagram of the maximum for the year. The method of estimating all of the data regarding the load of the electrified steam roads of Chicago is given in the appendix to this paper, on "Electric Power Requirements of the Electrified Steam Roads of Chicago," prepared by Messrs. Bird, Gear and Fowler.

The freight curve has an extremely good load factor. The passenger business is governed by exactly the same conditions, only intensified, that govern the passenger business in New York City.

The extreme peak in the morning and evening is caused by the suburban business, the extra amount of energy necessary at the time of extreme cold for traction purposes and the extra amount of energy necessary for heating purposes. If it were not for these two peaks the load factor

would even up better than it does, and yet, notwithstanding these peaks, the combined freight and passenger business is estimated to have 46 per cent load factor.

It might be of interest to add that in Chicago the light and power business by itself has a load factor a little under 35 per cent, and the street railway business by itself about 43 per cent, whereas the combined load factor is about 42.5 per cent.

I do not want to see those who are right on the threshold of entering into our line of business, the use of electrical energy, make mistakes owing to their ignorance of the real situation. I do not want to see them make the mistake that, in my judgment, largely through force of circumstances, the New York Central & Hudson River Railroad and the Pennsylvania Railroad made in building their independent power houses, probably as much because they could not find people to sell them energy as because they did not know they ought to buy energy instead of manufacturing it.

Fig. 5 shows the Chicago daily load factor. This diagram shows the improvement in load factor as it affects operating conditions, the improvement being due mainly to the railway load coming up earlier in the morning and the depression in the light and power load at the time of the evening railway peak. It is almost impossible to figure absolutely and closely this saving from concentration of production of electric energy. It is easy enough to figure the saving of investment, but it is pretty hard to figure the saving in operating expense. It is a very large amount, indeed, and the items especially affected are the items of what one might call "readiness to serve," including, of course, the expense incident thereto. I do not refer to fixed charges but to operating expenses outside of fixed charges. Although it is easy to figure the saving in fixed charges due to diversity, it is not so easy to figure the saving due to the broadening out of this daily curve, but it goes a long way toward reducing the "readiness-to-serve" charges per unit produced in a given time.

The average daily or operating load factors for the different systems in Chicago, operating separately, 55.6 per cent, is equivalent to thirteen and one-half hours straight-line or steady operation per day. The load factor for all combined on one generating system, 59.9 per cent, is equivalent to fourteen and one-half hours per day, or an increase of one hour, or 7.4 per cent. This improvement means that the fixed charges and "readiness-to-serve" portion of the operating expense is prorated over a greater number of units of output per day and per year.

Fig. 6 shows a diagram of the Boston daily load. It shows that there would be quite an improvement if the Boston Elevated and the Boston Edison loads were operated together. The average is 53.9 per cent operated separately and 59.4 per cent if operated as one system. A study of the New York daily load factors shows that operated separately the stations have 51 per cent and operated together 56.2 per cent.

Fig. 8 is the load diagram of the freight electrical requirements of the steam railroads in Chicago. This freight curve has an extremely good load factor, estimated at 70 per cent daily and 60 per cent yearly. Through freights come in during the early morning hours and are broken up, switched and transferred from 7 o'clock in the morning on, and then during the late afternoon there is another switching and transfer peak caused by the making up of the through freights and getting them ready to go out as soon as the late afternoon passenger peak is over. The peak on the in and out freight of the day occurs from 7 o'clock in the evening on, due to these outgoing through freights which were made up in the late afternoon.

Fig. 9 is the load diagram of the steam railroad passenger electrical requirements in Chicago. This diagram shows these requirements for December. It has the same general characteristics as the New York curve, with the high peak morning and evening, owing to the suburban passenger business and owing to the heating of the cars.

Fig. 12 shows the proposed steam railroad suburban and electrical requirements, month by month, in Chicago. In addition to the normal amount of energy required, there is the increased requirement for traction due to cold and the increase due to electric heating.

Fig. 10 shows the monthly variation in the total electrical requirements in the proposed electrification of the Chicago steam railroads. You will remember that the load factor of the through passenger business is extremely good, and that of the freight business is very good. That would indicate, except in the ten or twelve large cities to which I have referred, that the freight and passenger business ought to be very good throughout the country.

Fig. 11 gives a comparison between the swing maximum and the one-hour maximum load on the New York, New Haven & Hartford Railroad's Cos Cob station. This diagram of the New Haven road is important because it shows that small roads, installing their own plants, must provide a capacity sufficient to cover the maximum swing, which frequently lasts several minutes, and which in the case of the New Haven road apparently necessitates a reserve amounting to 74 per cent.

The three-phase capacity of the generators is 21,000 kw and the maximum load is 9050 kw, which is a reserve of 132 per cent. But single-phase operation really reduces the actual capacity of the generators, on a single-phase basis,

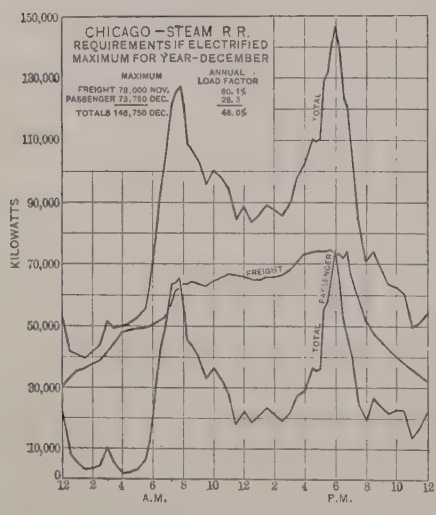


Fig. 7—Maximum Requirements for Chicago Railroads

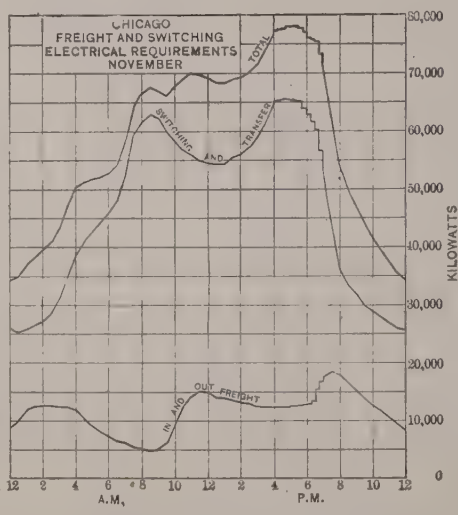


Fig. 8—Requirements for Chicago Freight and Switching Service

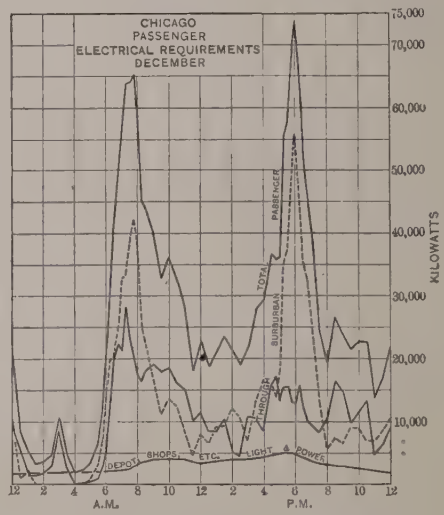


Fig. 9—Requirements for Chicago Present Steam Passenger Service

to 15,000 kw, which is equivalent to 74 per cent reserve. The company apparently has no greater reserve than is necessary, because it is installing three 6000-kw three-phase units for additional capacity to take care of additional electrification. In another part of the paper, for the purpose of figuring the capacity of the steam plants of each of the roads installing its own plants, instead of using this actual 74 per cent reserve, we have assumed 50 per cent, to be conservative, as compared with 25 per cent reserve in case of purchase of energy. The point brought out in this curve is also important from an operating standpoint, because, with a system of central stations for all energy used in a community, the entire load factor would be about 60 per cent, compared with 25 per cent for this diagram using the maximum swing.

I would like to say just a little with relation to the actual saving that could be obtained, assuming that an effort were made to bring about the concentration of production and

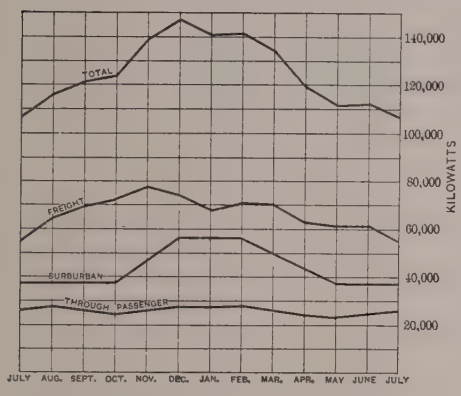


Fig. 10—Monthly Variation in Maximum Electrical Requirements of Steam Railroads, Chicago Zone

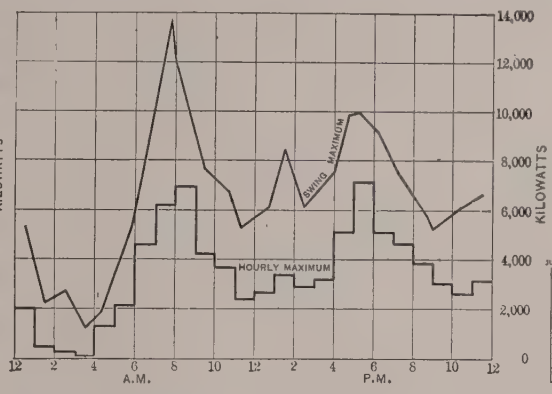


Fig. 11—Relation of Swing Maximum to One-Hour Maximum—Cos Cob Station, New Haven Railroad

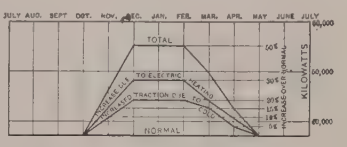


Fig. 12—Requirements for Steam Railroad Suburban Service in Chicago Zone.

ing primary distribution should be made in the area referred to, the amount of property that would be realized or made available for increased business would be worth $18,000,000, or thereabout. I do not think that the power necessary for the steam railroads centering in New York, and the primary system necessary to take that current to the railroads, would cost over $18,000,000.

Now, the savings are here at your feet. The details are at the disposal of anybody who wants to use them. I know that the change that I have been able to work in Chicago, from barely earning dividends to putting the property in a strong, conservative position, has been the result of following the policy that I have laid down here, and I urge the people who are interested to try to follow it out around New York. It is a policy that is worthy of the greatest engineers and worthy of the thought of the greatest financiers in this country. It is conservation of the truest order. If the same policy is carried out throughout the United States the conservation of fuel and labor alone will be something tremendous, while the release of capital that can be used in other directions will stimulate business.

There is no greater problem in the industrial world to-day, no problem that presents greater opportunities for the engineer to achieve distinction, no problem that presents greater opportunities for the financier to achieve distinction and profit, than the proper method of producing energy and distributing it in a given area; and involved in that question is the solution of providing money for that portion of the electrification of steam railroads that ends when the energy is put into the track.

the concentration of primary distribution system in the area of Greater New York, that is, an area including the Jersey shore a little beyond the Hackensack River. The total saving in investment that could be worked out over a period of relatively few years, based on the experience that we have had in Chicago, would amount to about $18,000,000 to $20,000,000. That is in investment alone. The saving in operating expenses would amount to about $1,000,000 a year. Now, figuring fixed charges of 5 per cent for depreciation and 5 per cent for interest on the saving in investment, and adding to that the saving in operating expense, you have a sum almost equal to $3,000,000. That sum, capitalized at 5 per cent, means a creation of $60,000,000 of value.

At the rate of progress now going on in the neighborhood of New York the business is bound to double inside of ten years. If the present scheme is followed out—if the traction companies have their own separate sources of supply, if the electric light and power companies have their own separate sources of supply, if the steam railroads that are apparently on the threshold of electrification have their own sources of supply—at the end of ten years the waste in money which will have taken place, on a 5 per cent basis, will be somewhere between $140,000,000 and $175,000,000. The direct saving by a concentrated system of generation and primary distribution, leaving out of consideration altogether the saving in operating expenses, is of itself, in my opinion, sufficient to provide the necessary funds for that portion of steam railroad electrification centering in New York. That is, assuming the steam railroad requirements as about 170,000 kw, I do not believe that the portion of combined generating stations and combined primary distribution system for that purpose would cost over $100 to $110 a kilowatt on the basis of a combined system.

The figures which my engineers have prepared indicate that if a systematic effort at massing production and mass-

Before concluding, I think it is but fair to my own staff that I should say that it would have been impossible for me to present this paper if it had not been for the loyal and valued assistance rendered me for three months in preparing data for this discussion, under the direction of Mr. Junkersfeld, of the Commonwealth Edison Company, and the close personal work of Mr. Fowler, our chief statistician; Mr. Gear, our engineer of distribution, and Mr. Bird, one of the engineers of our contract department.

ABSTRACT OF APPENDIX TO MR. INSULL'S PAPER, ELECTRIC POWER REQUIREMENTS OF CHICAGO STEAM RAILROADS ELECTRIFIED

BY PAUL BIRD, H. P. GEAR AND E. J. FOWLER

The electrical requirements of the freight service of Chicago have been worked out for the same zone that is being considered by the Association of Commerce committee on smoke abatement and electrification of railway terminals. The computations cover the year from July, 1911, to June, 1912, and it is assumed that the steam railroads in this district are electrified with no changes in the tracks and yards, and that freight is handled through the city in the same manner and following the same routes as it does to-day. When the railroads are actually electrified there is no question that great changes will be made in

the freight terminals, and that a large part of the freight that now comes through the heart of the city will pass around and outside the city limits and possibly outside the electrified zone.

Methods and Data Used in Making Computations.—From the Association of Commerce committee, a list was obtained of the number of steam locomotives used in the Chicago city limits in October, 1911. This list, showing the number of locomotives and locomotive hours in each class of service, was as follows:

Service.	Number of Locomotives.	Working Hours a Day.
Through freight	361	812
Switching	560	7223
Transfer	182	2378
Through passenger	336	801
Suburban passenger	200	1000

An estimate was made of the coal consumption per working hour of each class of freight locomotive, and from the coal burned in the city limits per day the necessary electrical requirements for the same service were computed:

October, 1911—City Limits.

	Through Freight.	Switching.	Transfer.	Total.
Number of locomotives	361	560	182	1,103
Number of working hours per day	812	7,223	2,378	10,413
*Lb. of coal per locomotive per hour	2,000	600	1,350	....
Tons of coal per day	812	2,196	1,602	4,610
Lb. of coal per hour	67,670	183,083	133,500	384,253
*Lb. of coal per hour per locomotive drawbar horsepower	10	12	10	....
*Efficiency (from drawbar to power house)	60%	60%	60%	....
Average electrical load in kw	8,675	19,072	16,473	44,220
*Watt-hours per ton mile	31	120	56	....
Ton miles per day	6,767,000	3,821,814	7,036,610	17,625,424

*Assumptions.

Having thus obtained the average power house load in kilowatts for the city limits and the month of October, 1911, the following steps were taken:

(1) The average load of 44,220 kw was apportioned among the various railroads operating in the city.

(2) The results were increased, so as to apply to the Association of Commerce electric zone instead of the city limits.

(3) A study was made of the movement of freight cars during the different hours of the day and the different months of the year. The increased traction on account of cold weather was also considered. The daily, monthly and yearly load factors were thus obtained.

(4) The maximum demand and consumption was then computed for each railroad and each month of the year.

(5) The results were checked in various ways.

Apportionment of Total Average Load Among the Railroads.—The total average load was found to be 44,220 kw for October and within the city limits.

Increase of Figures to Cover Association of Commerce Electric Zone.—A statement of the track mileage of all railroads for the city limits and for the zone was obtained from the Association of Commerce committee. With this as a basis, and from a careful study of the map, the figures of average electrical load were increased to cover everything within the zone. The average increase in load was 22 per cent, a total of 54,000 kw.

Load Factors, Etc.—A daily load factor of 75 per cent was assumed for the entire freight business of the Chicago district. L. C. Fritch (now chief engineer of the Chicago & Great Western Railroad) investigated the subject of electrification of the Chicago terminal of the Illinois Central Railroad in 1909. He, of course, had access to all the records of the railroad and his load curves for the freight service show a load factor of 75 per cent.

Average load in October, 1911, 54,000 kw.

Maximum load, October, 1911, 75 per cent load factor, 72,100 kw.

The following table shows the maximum kw, the kw-hr. and load factors for each month in the year:

Freight Electrical Requirements—Chicago.

	Per Cent of Average Daily Earnings for October.	Maximum Kilowatts—Normal Requirements.	Maximum Kilowatts—Additional on Acc't of Cold. Per Cent.	Maximum Kilowatts—Additional on Acc't of Cold. Am'nt.	Total Maximum.	Kw-hr.	Load Factors, Per Cent.
July, 1911	76.5	55,200	—	——	55,200	28,814,400	70.3
August	88.5	63,800	—	——	63,800	33,303,600	69.6
September	95.3	68,700	—	——	68,700	34,624,800	70.3
October	100	72,100	—	——	72,100	37,636,200	70.2
November	98.4	70,900	10	7,100	78,000	39,312,000	70
December	85.7	61,800	20	12,400	74,200	38,732,400	70.3
January, 1912	78.9	56,800	20	11,400	68,200	35,600,400	70.3
February	81.1	58,500	20	11,700	70,200	32,853,600	69.7
March	84.4	60,900	15	9,100	70,000	36,540,000	70.3
April	81.3	58,600	5	3,900	62,500	31,500,000	70.1
May	83.8	60,400	—	——	60,400	31,528,800	70.2
June	83.6	60,300	—	——	60,300	30,391,000	70
						410,837,200	

Average monthly load factor, 70.1.
Annual load factor, 60.1.
Normal maximum kilowatts assumed proportional to earnings.
Load factor for week day assumed at 75 per cent.
Sunday requirements one-half of week day, assuming four Sundays to month.

Ratio of passenger to freight load:

	Per Cent.
Total kw-hr. per year, passenger	183,452,500— 31
Total kw-hr. per year, freight	410,837,200— 69
Total kw-hr. per year, passenger and freight	594,289,700—100

The 1911 report of the Chicago smoke department gives the average daily coal used by railway locomotives in city limits as follows:

	Per Cent.
Tons of coal per day, passenger	1163— 21
Tons of coal per day, freight	4438— 79
Tons of coal per day, passenger and freight	5601—100

This is a good check on the computations of the electrical energy required as to the proportion between passenger and freight service, for it is to be expected that locomotives engaged in freight service operate less efficiently than passenger locomotives.

Saving of Coal Due to Electric Traction.—The total electrical energy per annum required by the electrified steam railroads of Chicago is:

	Kw-hr.
Passenger service	183,452,500
Freight	410,837,200
Total	594,289,700

At 3 lb. of coal per kw-hr. the total coal per year in the power houses would be 891,000 tons.

The 1911 report of the Chicago smoke department shows that the railroads burn in their steam locomotives about 1,850,000 tons of coal a year in the city limits. Increasing this figure by 22 per cent, it is seen that the railroads burn about 2,260,000 tons of coal a year in the electric zone. The ratio of the coal burned with electric operation to the coal burned with steam locomotives is 1 to 2.55.

W. S. Murray, electrical engineer of the New York, New Haven & Hartford Railroad, in a paper presented at the 1911 convention of the American Institute of Electrical Engineers, said: "It has been demonstrated that the ratio between the coal burned for operating passenger trains by electric rather than by steam locomotives is 1 to 2. In the case of switching engines this rate is much greater, a figure of 1 to 3 being conservative."

Tonnage of Freight Handled in Chicago.—The railroads do not keep their records so that the tons or car loads of freight handled in the Chicago district may be obtained. Apparently the only record of any sort that was ever kept of the freight movements was in 1902 and

1903 when a committee of Chicago railway officials made a report on the interchange of freight between the different roads. The figures given in this report cover the number of loaded and empty cars handled during the year ending June 30, 1903. To get at the tons of freight handled in the year ending June 30, 1912, the following assumptions were made:

Weight of empty freight car	18 tons
Weight of loaded freight car	40 tons
Days per year	330

Increase of freight business from 1903 to 1912, 67 per cent.

The last figure was obtained by plotting a curve of the total ton mileage of freight handled per annum in the United States from 1902 to 1910. This information was obtained from Slason Thompson's bureau of railway statistics. From the data given in the 1903 report it was also possible to approximate the number of switching movements, transfer movements and "in or out" or through freight movements.

After getting the number of tons of freight (including weights of cars) per day in each of these three classes of freight movement, by assuming the average distance travelled in each class of movement, the ton miles were obtained. The mileages assumed were:

Through freight	7 miles
Switching	2 miles
Transfer	10 miles

It may seem surprising that the average transfer haul is longer than the average in or out haul, but this is undoubtedly true. The list previously given shows 2378 transfer locomotive hours per day as against 812 through freight locomotive hours.

Knowing the average ton miles per hour and applying figures for "watt-hours per ton mile," the average electrical load was obtained. The following figures show the results of these computations:

For through freight, with an average length of movement of 7 miles and at an energy consumption of 30 watt-hours per ton mile, the eighteen principal railroads would require 8,073 kw for handling 922,607 tons, or 6,458,249 ton miles a day. For switching, with an average length of movement of 2 miles and an energy consumption of 120 watt-hours per ton mile, there would be required an average total of 11,457 kw for handling 1,145,707 tons, or 2,291,414 ton miles a day. For transfers, with an average length of movement of 10 miles and an energy consumption of 60 watt-hours per ton mile, there would be required 9,896 kw for handling 396,051 tons a day, or 3,960,510 ton miles a day. The total ton miles a day would be 12,710,173, and the average energy requirements, 29,420 kw.

The electrical requirements for passenger service are as follows:

PASSENGER ELECTRICAL REQUIREMENTS—CHICAGO.

	Kilowatt-Hours				
	Through.	Suburban.	Light and Power.	Grand Total.	Load Factor.
July, 1911	6,633,600	5,679,200	1,850,200	14,163,000	36.4%
August	7,045,700	5,816,700	1,882,700	14,745,100	37.4%
September	6,743,500	5,611,400	1,836,500	14,191,400	36.9%
October	6,504,000	5,679,200	1,895,000	14,078,200	35.8%
November	6,680,000	7,014,300	1,895,000	15,589,300	34.3%
December	7,472,500	8,518,800	2,068,000	18,059,300	32.8%
January, 1912	7,116,800	8,725,100	2,104,200	17,946,100	32.9%
February	6,658,700	8,109,200	1,816,600	16,584,500	32.7%
March	6,795,500	7,666,900	1,895,000	16,357,400	33.1%
April	6,123,400	6,453,100	1,836,500	14,413,000	34.6%
May	6,085,000	5,816,700	1,882,700	13,784,400	36 %
June	6,281,700	5,473,800	1,785,300	13,540,800	36.1%
Total	80,140,400	80,564,400	22,747,700	183,452,500	28.3%

SUMMARY OF RESULTS

Under a unified plan of power supply, only twenty-one additional substations would have to be established and the total number would be only forty-three as compared with seventy-two substations under group operation.

The number of transmission lines under the unified plan would be eighty-one as compared with 132 under group operation, and there would be over two and one-half times the length of line required for group operation as compared with the unified plan.

The data for the unified plan are as follows:

Number of substations	43
Number of lines	81
Capacity of substations, kw	205,000
Capacity of generating stations, kw	142,000
Length of lines, feet	1,390,000

A comparison of the investment necessary for unified power supply, as compared with a separate supply for each road or group of roads, shows the following saving in favor of unified power supply:

Power-house capacity	99,500 kw.
Substation capacity	39,500 kw.
Transmission line cables, in feet	2,283,000

In addition to the foregoing saving, there is a corresponding saving in conduit construction, where the lines are underground, and in pole line construction, where the lines are overhead. There is also a corresponding and possibly even greater saving in the 600-volt feeder, cable and conduit or pole lines for same. It must also be borne in mind that where the stations and substations are of larger aver-

SUMMARY OF TOTAL ELECTRICAL REQUIREMENTS—ALL STEAM ROADS.

	Kw Load at Time of Monthly Max. Demand.		
	Freight.	Passenger.	Total.
July, 1911	54,250	52,350	106,600
August	62,700	52,980	115,680
September	67,500	53,310	120,810
October	70,900	52,820	123,720
November	76,700	63,090	139,790
December	73,000	73,750	146,750
January, 1912	67,000	73,020	140,020
February	69,000	72,790	141,790
March	68,800	66,380	135,180
April	61,400	57,800	119,200
May	59,400	51,330	110,730
June	59,300	52,110	111,410

	Kilowatt-Hours			Load
	Freight.	Passenger.	Total.	Factor.
July, 1911	28,814,400	14,163,000	42,977,400	54.3%
August	33,303,600	14,745,100	48,048,700	55.8%
September	34,624,800	14,191,400	48,816,200	56.2%
October	37,636,200	14,078,200	51,714,400	56.4%
November	39,312,000	15,589,300	54,901,300	54.7%
December	38,732,400	18,059,300	56,791,700	52 %
January, 1912	35,600,400	17,946,100	53,546,500	51.5%
February	32,853,600	16,584,500	49,438,100	51.8%
March	36,540,000	16,357,400	52,897,400	52.5%
April	31,500,000	14,413,000	45,913,000	53.4%
May	31,528,800	13,784,400	45,313,200	55 %
June	30,391,000	13,540,800	43,931,800	55 %
Total	410,837,200	183,452,500	594,289,700	46.2%

age capacity the investment per kilowatt is less than where the same load is distributed over a larger number of stations and substations. This same principle applies to transmission and distribution cable and conduit and also to pole lines.

Also the same principle applies, to fully as great an extent, in the operating and maintenance cost of stations, substations and lines.

DISCUSSION ON MR. INSULL'S PAPER

The first railway session of the convention of the American Institute of Electrical Engineers was called to order by President Dunn at noon on Wednesday, June 26. The meeting was devoted to a discussion of an address by Samuel Insull, Chicago, on "The Relation of Central Station Generation to Railway Electrification."

Frank J. Sprague, New York, chairman of the railway committee of the Institute, opened the discussion. He pointed out that debate on the merits of the three principal systems of electrification has been held somewhat in abeyance of late in view of the committee's belief that what are needed are actual results from the operation of existing electrified roads. The speaker felt that the cost of power is a subject of fundamental importance in this connection. Efforts promising some success are being made to induce manufacturers and other interested parties to take up cooperatively a specific railway electrification problem on a

large scale and in a comprehensive manner. Mr. Sprague reviewed the conditions of the Chicago electrification problem, pointing out that the demand for the abolition of the steam locomotive was initiated by the desire of the public to abate the smoke nuisance. Some fifty-two railroads enter the city, and the traffic is highly diversified. The electrification of these lines upon an independent basis would result in little else than economic confusion, and the problem must be treated as a whole in order to secure the best results. The cost of independent electrification in such a situation would be prohibitive. The supply of power to these lines from grouped plants would represent a step in advance beyond individual supply, but the real solution of the problem must be on the basis of centralized generation and distribution.

Mr. Sprague pointed out the possibilities of establishing a financial organization prepared to take the capital risks of electrification through a contract providing for operation by electric motive power over a fixed term and possibly providing for the supply of rolling stock. Referring to the condition at New York, the speaker said that in the electric zone of the New York Central lines the insurance of an ample supply of power was a fundamental necessity, the cost of power being a secondary consideration. The net cost of producing power in five of the principal generating plants supplying energy for train service at New York averaged in 1911 about 0.51 cent per kw-hr. delivered at the switchboard, excluding fixed charges. This figure averages somewhat higher than the results obtained in very large stations of modern design. Mr. Sprague pointed out the fact that the power cost at the Cos Cob station of the New Haven system runs from 45 to 60 per cent higher than in the other plants serving electrified trains, and he suggested that the purchase of electricity would have been desirable in this case.

H. C. Stott, New York, contended that Mr. Insull's results were obtained in Chicago by combining in one or two plants of modern design the outputs of several broken-down stations. He could see no other argument supporting Mr. Insull's conclusions. As compared with an old plant a modern station ought to show at least 20 per cent gain in economy. Mr. Stott said that his investigations of the relation between load-factor and power cost show that the cost varies inversely as the fourth root of the load factor. He thought that on this basis the saving resulting from centralized plant operations in a city like New York would be only about one-eighth of that figured by Mr. Insull. Mr. Stott questioned the economy of very large turbo-units, say of 20,000 kw rating, as compared with 10,000-kw units, and touched upon the advantages of shifting the load from one plant to another in an interconnected system. The diversity factor is practically nil in railway work. The total installation capacity must be the same no matter how many plants are combined in one. The speaker disagreed with Mr. Insull's contention that 50 per cent reserve capacity is required in individual plants against 25 per cent in combined installations. With modern equipment a reserve of 10 per cent is sufficient, provided this is utilized in connection with the overload capacity of the equipment. The total cross-section of copper is the same, regardless of how many plants are required, although the length of copper obviously varies with the conditions. The speaker regretted that Mr. Insull failed to show the results of his plant combinations in detail and suggested that there should be a division of profits between the producer of power and the consumer.

William McClellan, New York, said that only a certain number of railroads can be electrified economically at the present time. The investment cost is the great stumbling block, taken in connection with the amortization of the existing investment. It was his opinion that the cost of the third-rail system, of the single-phase system and of electric locomotives is unlikely to be decreased to any extent. If enlargement of plant does not decrease the cost of power there is no reason for working out the substation idea still further. The price of power should include a means for amortizing old equipment so that objectionable standing assets and corresponding charges may not be continued.

Percy H. Thomas, New York, said that there is a possibility that the railroads may be waiting for something better to turn up in the electrical field. He felt certain that the concentration of power production and distribution is bound to increase. W. G. Carlton, New York, pointed out the possible benefits of pooling loads between stations, after the manner of pooling rolling stock. The size of generating stations is reaching the economic limit.

Calvert Townley, New York, said that to carry Mr. Insull's paper to its logical conclusion might lead to the absurdity of concentrating the power generation of the United States in a single plant, eliminating for the moment the questions of divided ownership, municipal and state boundaries. The whole problem of power supply is distinctly an engineering question involving transmission and distribution conditions no less than matters pertaining to generation. The saving due to diversity factor is reduced as the size of the station increases. The speaker did not oppose consolidation of plants, but said that he could not accept the author's paper as a general cure-all for railway electrification problems. Mr. Townley said that the New Haven company failed to buy power from the New York Central organization because the lowest price considered by the latter was 2 cents per kw-hr. It was necessary to have economical power on the system at a certain time, and hence the company built its own plant at Cos Cob. The poor load factor of the New Haven system was anticipated, but it will probably be improved when the progressing electrification to New Haven is completed. The ability of the central station to undertake to supply future power demands is a strong argument in facor of the purchase of power by railways. The increases in load handled by the central station cut out the amortization of no small investment by the power user.

S. D. Sprong, Brooklyn, and W. S. Lee, Charlotte, N. C., also spoke briefly. Mr. Lee emphasized the increasing distances of modern transmission and voiced the advantages of interconnected networks with stations not too near together, carrying local loads and interchanging energy to maintain good load factors in the individual installations.

Closing, Mr. Sprague pointed out that Mr. Insull in no sense recommends the concentration of power generation under a single exclusive roof. Concentration should go only so far as to call for units in reasonable size and number, operated at a fair load factor. He reiterated the opinion that the existing plants supplying the railroads in the New York district with electricity could be run for less money if operated under a common management with the resulting interchange of loads.

SECOND RAILWAY SESSION

The second railway session was called to order Thursday noon by Chairman Frank J. Sprague, of the railway committee. The discussion of Mr. Insull's paper was opened by W. S. Murray, New Haven, Conn., who said by way of introduction that the next link in the New Haven electrification will be the section from Boston to Providence, which will shorten the steam haul between New York and Boston. Mr. Murray corroborated Mr. Townley's remarks regarding the necessity of building an independent plant for the New Haven service, the question of price being the chief issue. He objected to the assembly of the power plant cost data discussed by Mr. Sprague for comparative purposes on account of the wide differences in local conditions which control the economics of production. The Cos Cob costs are higher because of the poor present load-factor, probable the worst in New England under the enforced conditions now controlling the situation. At Port Morris the storage battery system connected with the plant's output

tends to raise the load factor. The amount of energy required per ton mile of train propulsion, on the other hand, is less at Cos Cob than elsewhere. The Cos Cob plant has been operating almost entirely upon a construction basis, including the furnishing of steam to contractors and supplying power temporarily to the signal equipment of the electrified division. Inside of another year the costs are bound to decrease. The valleys of the load will be filled by a large freight load operated at night, and energy will be delivered to lighting and power companies owned by the New Haven company. Within another year a complete engine stage will be in operation.

W. B. Jackson, Chicago, said that the Cos Cob plant is of particular interest in view of the conditions under which it operates, and predicted that the future cost of power there will be much reduced by the anticipated improvement in diversity factors. The large plant is of importance chiefly in connection with the assumption of service which improves the load factor and conditions of generation. The paper was a splendid plea for the concentration of all electric service in an economic district. No one can take exception to the general principle that parallel channels supplying the same sort of power must be eliminated, in the larger economic sense. Even in the smaller centers concentration of production means less cost per kw of plant construction and per kw-hr. of output and an immense improvement in the large problem of plant administration. Satisfactory correlated operation of plants also means undoubted gains. He paid a high tribute to the author's work in preparing the paper.

Lee H. Parker, Boston, emphasized the feasibility of supplying all the railroads in the Boston district from a single generating service. The load is comparatively small and should be handled without difficulty.

C. O. Mailloux, New York, pointed out that, while local conditions largely control plans for energy production and distribution, the tendency is toward specialization in the different department of electrification. In new work precedents are of less importance. The reduction in capital possible through the purchase of power from a centralized source presents great interest and is a factor of great economic value. Lower costs follow the reduction of investment, rendering the capital already in use more efficient. He discussed the problem in a broad manner, contending that in the long run expediency must determine the course to be followed. Centralization by no means means the installation of all generating equipment in one station, but the interconnection of efficient economic units of production.

P. W. Sothman, Toronto, Ont., showed that it is possible to put too much capacity under a single roof. Local conditions must control the solution of every engineering problem. The combination of railway and factory loads is highly desirable from the economic standpoint. He touched upon the possibilities of a rearranged train schedule, which in one instance had reduced the peaks from 1700 hp to 1200 hp. In Europe storage batteries are used with great success in cutting down peak loads upon plants. Flexibility is secured by the use of mixed systems. Railroad electrification is almost entirely a commercial problem. Its engineering success is thoroughly established.

C. L. de Muralt, Ann Arbor, Mich., suggested the possibility of the supply of energy to the United States from a single network. He pointed out the saving in fixed charges in equipment where the load factor is high. He pointed out the coincidence of railroad and lighting and power peaks, which tends to make the diversity factor less beneficial. The possibilities of the freight and through traffic load are of great importance economically.

N. W. Storer, Pittsburgh, Pa., concurred with the author in regard to the broader economic aspects of concentrated production and distribution. He questioned the feasibility of subdivided operation and pointed out the benefits of a government-regulated system of distribution, assuming a larger degree of state supervision of railroads. Mr. Storer also said that the adoption of a 15-cycle system by the railroads, if found practicable, would be justified on that ground alone.

E. N. Lake, Boston, said that the Boston Elevated Railway Company's decision to build its own plant was a wise one in view of the cost and prices of energy developed by the local central-station system.

Closing the discussion, Mr. Sprague said that in the matter of reliability, efficiency and size, modern apparatus has become well standardized and developed. Permanent construction and greater restrictions of right-of-way have been carried to pretty definite conclusions. Great advances in motors have been made in the past three years. He questioned the feasibility of higher voltages, say much above 15,000 volts in single-phase service, 6000 volts in polyphase service, 2500 to 3000 volts in overhead d.c. service and 1200 to 1500 volts in protected third-rail systems. Comparative results are now most needed, and there appears to be a limit to revolutionary development. The absence of complete electrification in the existing terminal and suburban zones at New York is a present drawback of serious magnitude. The elimination of the steam locomotive from an engine stage and the publication of actual facts and costs from any and all systems will give the industry the necessary data for further substantial advance. He characterized Mr. Insull's paper as an argument along the broadest lines on behalf of concentration of power generation and distribution.

CHICAGO ELECTROLYSIS DISCUSSION

In the continued session of the final hearing on the electrolysis prevention ordinance before the gas, oil and light committee of the Chicago City Council on July 1 Ray Palmer, city electrician, replied to a number of the points brought out in the discussion by Mr. Rice, which was reported in the ELECTRIC RAILWAY JOURNAL of June 29, 1912. Mr. Palmer read from some of the reports of the National Electric Light Association and from the discussion by Prof. Albert F. Ganz on electrolysis before the American Waterworks Association, which emphasized his point in relation to the damage due to electrolysis.

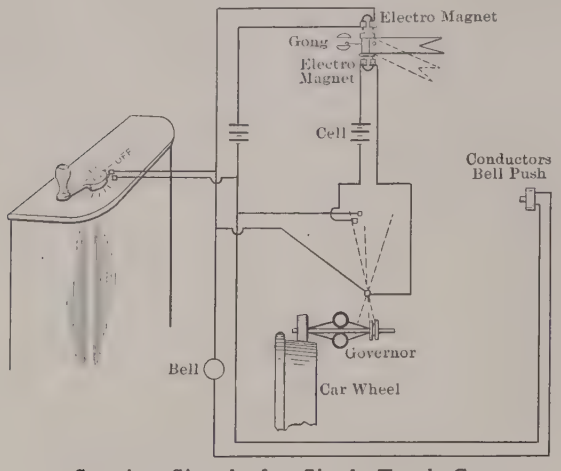
In reply to Mr. Rice's statement that a 12-volt drop would not eliminate stray currents, Mr. Palmer said he could agree to the statement but added that the proposed reduction would prevent electrolytic damage. Mr. Rice stated that the booster system was not a cure-all, but would need to be changed to meet conditions. Mr. Palmer took exception to this statement by stating that the booster system would not have to be changed any more than the positive feeder system. Mr. Palmer said there were three ways to reduce the drop in order to meet the ordinance requirements: first, by installing a negative booster system; second, by reducing the substation feeding area, and, third, by insulating the return conductors. If a trial drainage system should be installed irreparable loss would result.

In concluding Mr. Palmer discussed the detailed estimate, presented by the railway companies, of the cost of a booster system installation. He stated that the charges for insurance, taxes and depreciation were too high and should be reduced to 1½ per cent each, which would result in a saving of $106,000 annually in fixed charges. Mr. Palmer then took up specific instances of the estimated installation costs and stated that the charge per kilowatt should not be in excess of $23.20.

At the conclusion of Mr. Palmer's discussion Mr. Gurley requested that the final hearing be continued until he could prepare a substitute ordinance and introduce further evidence. This was granted. Mr. Gurley said that if the proposed ordinance was passed it would be carried to the courts because the railways could not finance the additional expenditure.

TRIAL DOUBLE-DECK PREPAYMENT CARS FOR LIVERPOOL TRAMWAYS

On Feb. 16, 1912, the tramways committee of the Liverpool Corporation Tramways approved the building of two different double-deck cars with prepayment features according to designs made by C. W. Mallins, general manager.

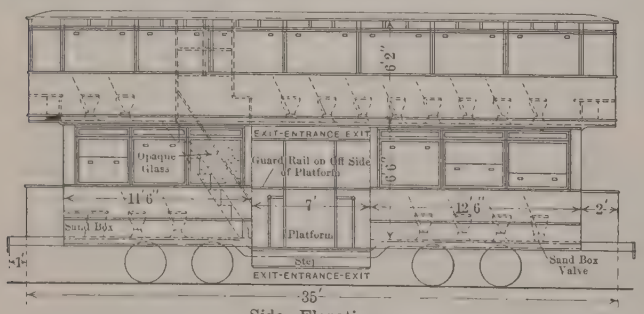


Starting Signals for Single-Truck Car

Lower deck plans and side elevations of both cars are reproduced in the accompanying drawings.

The first design calls for a double-truck center-entrance car seating thirty-two passengers on the lower deck and fifty-two passengers on the upper deck. A double staircase inside the car body affords separate entrance and exit to the upper deck, which arrangement also gives a separate entrance and exit on the lower deck. This car is 36 ft. long over all, 7 ft. 4 in. wide outside, 6 ft. 8 in. wide inside and 16 ft. from the ground to the outside of the roof. The center entrance platform, which is 7 ft. long, divides the lower body into two compartments fitted with transverse seats and balanced drop sashes. The smaller compartment has swing doors opening inward, while the larger compartment has double sliding doors recessed in the bulkhead.

The central platform is divided into three aisles by light turn-over brass railings. The unused or off side of the platform is protected by horizontal bars which are arranged



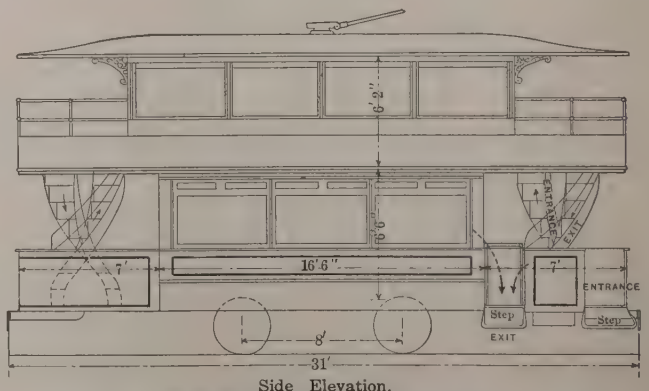
Double-Deck Center-Entrance Prepayment Car

to slide upward when not in use. The outside aisles are used as exits and the large center aisle for entrance, all being under the control of the conductor. Two separate straight stairways run parallel from the platform and open into the upper deck through vestibules, the near-side stairs serving for exit and the off-side stairs for entrance. This staircase arrangement permits the car to be quickly filled and emptied without any confusion. As the platform has ample standing room, the car can be started before all boarding passengers have paid fare and entered either compartment.

The main doors leading from the center platform are controlled by springs in such manner that when the doors are pulled half-way the spring completes the rest of the travel and holds them either wide open or shut tight as the case may be. A single sliding door at the opposite end of each compartment leads to the motorman's cab.

Among the merits of the center entrance is the protection from the weather which is afforded to the stairs and platform and the elimination of tilting by obtaining a more equal distribution of passenger weight over the body and truck springs. The side sills are dropped at the center to allow the platform and entrance step to be several inches lower than was possible with end platform cars using like trucks and motors. A safety feature to forestall platform accidents is the use of flap gates or barriers, bearing a suitable warning, which are mounted on the vertical stanchions at the center opening. These barriers are so connected with the starting signal that it is mechanically impossible to give the signal until the gates close. The gates open automatically when the car comes to a standstill. Although it is possible for a person deliberately to push the barrier aside while the car is in motion, this action would clearly make him assume all responsibility.

The single-truck top cover, double-deck car is 31 ft. long over all and seats seventy-four passengers. This car has a double staircase on each of the 7 ft. railed platforms, thus affording separate entrance and exit to the upper deck and also to the lower deck. The truck has a wheelbase of 8 ft. The double sliding body doors in the end bulkheads are controlled by means of springs. This car is furnished with special equipment of the character shown on this page, whereby the motorman gives a definite signal (independent of the conductor) to the passengers on the rear or boarding platform that the car is about to start. The device embraces a balanced or spring-controlled signal arm which is operated by two electro-magnets energized by cells having a connection controlled from three different positions as follows: From the controller power handle in the idle



Double-Deck Single-Truck Prepayment Car

motion between the off position and first power notch; from a small governor driven off the truck wheel; from the push of the starting signal on the conductor's platform. It will be seen from the connections on the diagram that the signal must fall before the car starts and so give warning both to the eye and ear, quite independent of the conductor who may be on the upper deck.

TRACK STUDIES BY THE TRACK AND ROADWAY DIVISION OF THE BOARD OF SUPERVISING ENGINEERS

In previous reports of the Board of Supervising Engineers Chicago Traction reference has been made to various investigations on track and track material which were conducted at that time with the view to developing material and to perfecting designs of all structures which had an important bearing on the efficiency of the rehabilitation work. Chemical treatment of the ties, strength of switch tongues, holding power of spikes, efficiency and life of electric welded rail joints and deflection of track under load have already been considered. The last-named investigation developed the interesting fact that ordinarily track deflection is greatly magnified by the eye and is rarely more than 1/16 in. in amplitude; that the concrete construction when properly laid maintains its permanent state without deflection under car load; that rail deflection occurs only at the moment of car passing, and finally that the speed of the car has no effect upon track deflection within the limits of such observed speeds as are ordinarily encountered in city transportation. The screw spike was found to be effective when used in conjunction with a tie plate, and subsequent tests reported herein have fully confirmed these original observations noted in Report No. 2 of the board.

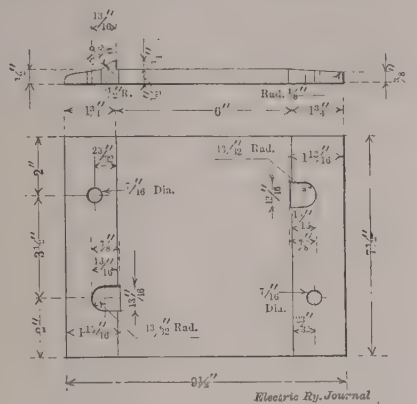


Fig. 1 — Standard Flat-Bottom Shoulder Tie Plate

TIE TIMBER TESTS

The following series of tests were conducted in the physical laboratory of the Armour Institute of Technology, under the supervision of the board's engineers, to ascertain the comparative strength and resistance of various tie timbers used in the construction of the street railway tracks under the board's specifications.

Spike-Pulling Test.—The special object of these tests was to determine the comparative holding power of the standard track spike and of the screw spike in various timbers as developed by the board. Three spikes of each kind were driven into each timber tested, a template being used so that all samples would be set to the same depth as would occur in normal field construction. These spikes were then withdrawn at right angles to the face of the tie by means of a special holder and at a speed of 1/16 in. per minute. The load was measured on a 60,000-lb. Olsen testing machine and applied as a direct vertical pull along the axis of the spike shank. In the case of the screw spikes an entrance hole, such as is used in the regular track construction, was bored into the tie to receive the spike; for hard woods this was ½ in. in diameter, for soft woods it was 7/16 in. in diameter.

Indentation Tests.—Tie plates were placed on the tie as in field construction. A steel casting of face equal to that of the base of the standard rail (6 in.) was mounted on the plate and then loads were applied at right angles to the tie plate, directly from the compression head of the testing machine, at a speed of 1/16 in. per minute. An initial load of 500 lb. was used in all tests, to which load frequent returns were made from the higher loads. All indentations were measured by a deflectometer, reading to one one-thousandth inch, fastened under the compression head of the testing machine.

The materials used in the tests were as follows:

Timber	Piece Number
Short-leaf yellow pine (untreated)	1 and 2
Loblolly pine (treated)†	8 and 10
Short-leaf yellow pine, early growth (treated)	16 and 19
Long-leaf yellow pine, half sap (treated)	17
Long-leaf yellow pine (untreated)	18
Black gum (treated)	7 and 12
White oak (untreated)	20
Hemlock (untreated)	6 and 15
Spruce (untreated)	9 and 23
Oregon fir (untreated)	11
Tamarack (untreated)	13 and 21
Long-leaf yellow pine (heart) (untreated)	14
Red gum (untreated)	24 and 25
Red oak (untreated)	26 and 27

†The preservative treatment was in all cases chloride of zinc.
All ties were well seasoned and dry.
Screw spike—Board of Supervising Engineers standard.
Track spike—Standard railway 5½ in. x 9/16 in.
Tie plate "B"—Board of Supervising Engineers flat bottom, 6 in. x 9½ in.
Tie plate "C"—Board of Supervising Engineers corrugated bottom 6 in. x 9½ in.

Note.—Present standard 7½-in. x 9½-in. shoulder tie plate now in use, shown also in Fig. 1.

Result of Tests.—The results of tests may be summarized by the following deductions:

Although the holding power of the screw spike is approximately three times that of the standard 5½-in. x 9½-in. track spike in any given timber, the relative holding power in the different timbers is such as to make the screw spike in treated pine timbers fully equivalent to the standard track spike in good white oak.

Regarding the resistance of the fiber of the wood to the indentation of a tie plate, the ratio of this resistance for a flat-bottom plate to that for a corrugated-bottom plate is decidedly greater than the ratio of the bearing area of the flat-bottom plate to that of the corrugated-bottom plate, that is, for the same unit load per square inch of actual surface contact the indentation with the corrugated plate is considerably greater than with the flat-bottom plate. In most cases the deformation is twice as great. This holds for all timbers treated and untreated.

The chloride of zinc treatment used for preservation purposes on the loblolly and short-leaf yellow pine ties has the additional feature of increasing the fiber strength of these timbers to such an extent as to make them compare favorably with the long-leaf yellow pine ties in resisting indentation of a tie plate.

The adoption of the flat tie plate shown in Fig. 1, with its increased bearing area, as a remedy for track deflection, due to permanent deformation of the timber fibers, was fully warranted by the results of this investigation.

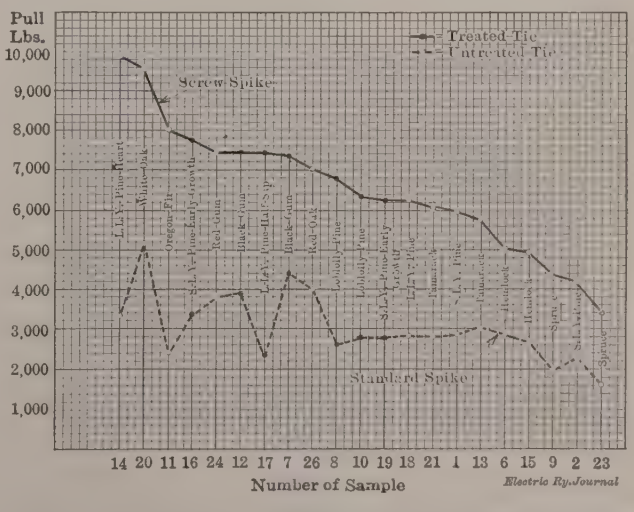


Fig. 2—Comparative Holding Power of Standard Screw Spikes in Various Timbers

Comparing the results of these spike-pulling tests with those previously reported by the board, it is of interest that in all cases the preliminary data relating to the holding power of screw spikes were independently confirmed by the

results of the 1909 tests and were shown to be very conservative.

Holding Power.—Fig. 2 compares the relative holding power of standard and screw spikes in various timbers, these timbers being ranked according to their relative holding strength with the screw spike. The lower curve indicates the relatively less holding power of the standard

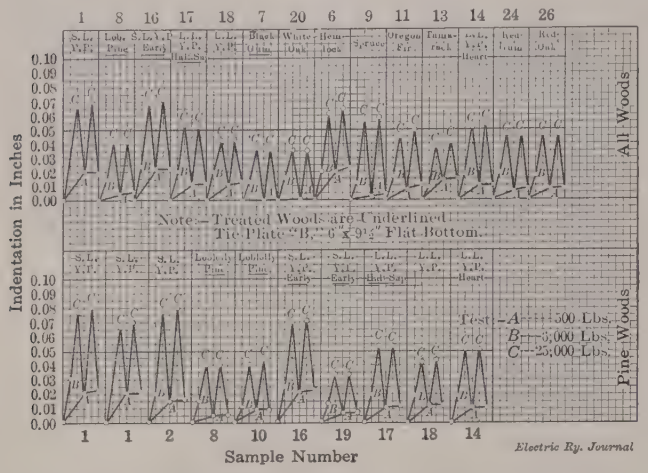


Fig. 3—Comparative Deformation of Tie Timbers with Flat Tie Plate, Showing Relative Recovery After Application of Maximum Loads and Permanent Indentation

spike observed in all cases; with a few exceptions this relative proportion holds throughout the tests. It is apparent from the curves that the softer woods have not much over one-half the strength of the harder woods or of long-leaf yellow pine, mostly heart.

Indentation.—The original report contained fifteen sets of curves which summarized the result of indentation tests on typical timber samples with two or three applications of maximum pressure. Some curves indicated the permanent deformation of fiber and cumulative injury under excessive maximum loads; others represented typical deterioration tests on various timbers, showing in addition the fatigue curves resulting from the use of the corrugated tie plate as compared with the flat tie plate. This so-called fatigue manifests itself in the fact that with successive applications of the same pressure the fibers did not show complete recovery. Gradual ascent of the fatigue curve therefore indicates permanent deformation of the wood fibers, and in all cases that of the corrugated tie plate is

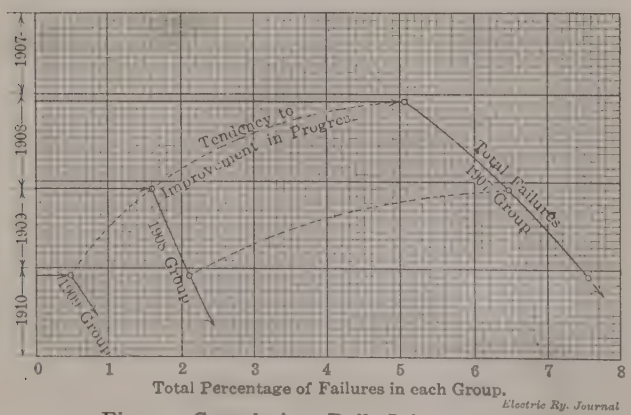


Fig. 4—Cumulative Rail Joint Failures

much greater than the flat tie plate owing to the smaller bearing area.

During none of these indentation tests was the load entirely removed, as the resulting possible change in tie-plate contact might have entirely vitiated the results indicating abnormal recovery at minimum loads; consequently the load was not reduced below 500 lb. Fig. 3 shows clearly the recovery from load "C" to load "A" in succession. Thus in sample 1 permanent deformation resulted only from the first application of 25,000 lb. load, but the second application showed practically no further deformation. Sample 6, on the other hand, showed continued deformation, while white oak, sample 20, showed practically complete recovery with no deformation. In these tests load "B" represented approximately the tie-plate load, such as would result from the passing of an ordinary car. Some of the softer woods were tested to practical failure. The tests on hard woods are remarkable in the coincidence of the results and the complete recovery.

With the pine timbers it appears that the average permanent indentation under normal car loads is almost negligible, 0.025 in. One tamarack sample, No. 21, showed unusually good results with complete recovery up to loads of 30,000 lb. equal to white oak. On the other hand, another sample of tamarack, No. 13, showed equally poor results, indicating the possibility of a considerable range of values in the poorer timbers and the danger of drawing conclusions from one sample. These tests do, however, indicate that the normal car loading is well below the limit of strength, especially with the increased bearing area of the flat tie plate.

RAIL JOINT BREAKAGES

A detailed record of all rail joint repairs is maintained by the track and roadway division in order that data may be available ultimately to determine the average life of the various types of joints. The observations on electric welds cover a total of nearly 50,000 joints. From the records it is possible to trace the history of each year's group of joints so that a comparison from year to year may be had of the efficiency of the joints originating in each successive year installed. The table on page 23 shows the number and percentage of joints broken and rewelded, classified in this manner. When plotted in the form of a curve, Fig. 4, the results appear fairly consistent. It is not considered proper as yet to draw any fixed deductions from the diagram on account of the short life history available. However, it is true that in the second and third year's construction work the electric welding process was materially improved, resulting in very much lower percentage of failures than in the first and second year. These curves, it will be noted, are plotted on the cumulative plan, that is, in the history of the 1907 group of joints, for example, the curve gives the total present breakage of this group up to the time in question. This bears no relation to the percentage failure per year, which may be regular in some cases and irregular in others. For example, 1908 construction showed only 2 per cent breakage at the end of the second year after installation, while the 1909 group appears to show still further improvement.

Fig. 5—Screw Spike After Two and a Half Years' Service, and New Spike

DETERIORATION OF SCREW SPIKES

Examination of track built in previous years showed that where screw spikes had been inserted in ties treated with zinc chloride a deterioration of the spike resulted. The reason for the damage is believed to be local chemical and galvanic action in the bored spike hole, which usually contains water. Each spike hole forms a single cell containing a strong solution of zinc chloride in which the screw spike is immersed. Free chlorine and hydrochloric acid gases assist in the destruction. While there seems to be no immediate remedy at hand which might be applied to stop or partly suspend the deterioration which is going on ap-

parently at all times, the removal of this difficulty in the future will be obtained by abandonment of zinc-treated ties for ties treated with creosote. Therefore, specifications have been revised to include only No. 1 white oak, 90 per cent heart yellow pine (both untreated) and soft wood ties treated with creosoting process only. Fig. 5 shows a normal and a deteriorated screw spike.

SUMMARY RECORD OF ELECTRIC WELDED RAIL JOINTS BY YEARLY GROUPS

Year of Failure		Welded in 1907	Welded in 1908	Total to Feb., 1909	Welded in 1909	Total to Feb., 1910
1907	Joints welded	8,281	....	....	....	....
	Failures	417	....	....	....	....
	Per cent of failures	5.04	....	....	....	....
1908	Joints welded	8,297	18,371	26,668	....	....
	Failures	119	297	416	....	....
	Per cent of failures	1.43	1.62	1.56	....	....
	Total to 1909:					
	Joints welded	8,297	18,371	26,668	....	....
	Failures	536	297	833	....	....
	Per cent of failures	6.46	1.62	3.12	....	....
1909	Joints welded	8,299	18,380	26,679	21,716	48,395
	Failures	92	91	183	104	287
	Per cent of failures	1.11	0.50	0.69	0.48	0.59
	Total to 1910:					
	Joints welded	8,299	18,380	26,679	21,716	48,395
	Failures	628	388	1,016	104	1,120
	Per cent of failures	7.57	2.11	3.81	0.48	2.31

SINGLE-PHASE RAILWAYS IN THE HAUTE VIENNE DEPARTMENT, FRANCE

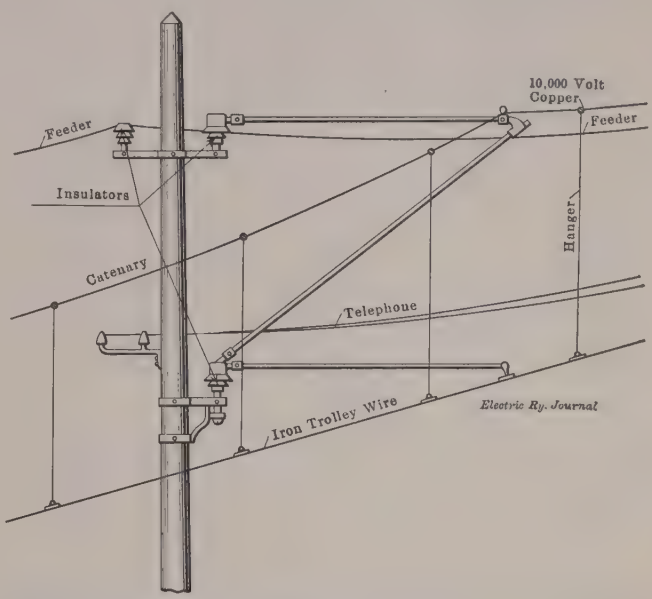
An article printed recently in the *Light Railway and Tramway Journal* describes a 207-mile of meter-gage, 10,000-volt, single-phase railway system now under construction in the Haute Vienne Department, central France. These lines are being built by the department, but will be operated for sixty-five years by the concessionaires, Messrs. Giros & Loucheur. The center of the system is at Limoges, whence four lines radiate in the several directions shown on the accompanying map. All of these will traverse agricultural and industrial districts which are not fully served by trunk-line railways. The section from Limoges to Aix is already completed.

Energy is furnished by a hydroelectric station at Eymoutiers on the Vienne River, 29 miles from Limoges, and by a 1500-hp steam reserve station at Limoges. The hydroelectric station has two Francis 1200-hp horizontal

Map of Proposed Single-Phase Lines in and About Limoges, France

turbines, each of which utilizes a fall of about 164 ft. Each turbine is connected to an Alioth 850-volt, 25-cycle alternator. The current is transmitted at 50,000 volts to Limoges, where it is reduced to 10,000 volts for trolley distribution. Within Limoges, however, the trolley potential is 650 volts.

The catenary system, which is employed only for the high-tension lines, is notable for the use of a galvanized iron trolley wire of Fig. 8 section corresponding approximately to No. 000 B. & S. gage. The cable is of No. 2 steel wire. A copper feeder is run in parallel with the line to avoid excessive transmission losses. The hangers are formed of rods and the brackets of piping. A flexible connection is provided between the bracket and the trolley



Perspective View of Catenary Construction on Limoges Single-Phase Lines

wire to permit a reasonable degree of swaying. Counterweights are used to maintain a constant tension. The contact line and catenary are separately insulated from the ground. The same poles carry the 10,000-volt feeder and the metallic telephone circuits.

The track is of light construction, the rails weighing but 40 lb. per yard. In Limoges and some other places, however, where the traffic is heavy, grooved rails weighing 114 lb. per yard are used. The cars for service in Limoges and vicinity weigh 18 tons, but those used for the suburban lines weigh 28 tons. Two 60-hp motors are carried on the Limoges cars and four of the same capacity on the suburban cars. The latter are fitted to take care of trailers. All motors are on the Siemens series compensated type, designed to operate at 300 volts, 800 r.p.m. The suburban cars can haul 41 tons and the city cars 25 tons at speeds up to 18 m.p.h. on 6 per cent grades and 28 m.p.h. on the level.

The current is taken from the line at 10,000 volts through a pantograph and transmitted to an oil-insulated, air-cooled auto-transformer which is placed under the car. This auto-transformer permits the use of potentials from 150 volts to 500 volts. In addition, a 600-volt tap is provided for city operation, two 50-volt taps for the circuit breaker relays and 100-volt taps for the lighting, heating and air-compressor circuits. The pantographs are of the Siemens type, each having two oscillating bows at the top to care for minor variations in height. The main frame of the pantograph is raised by means of compressed air or a hand-operated air pump. The pantographs are constructed for a contact line elevation varying from 13 ft. 6 in. to 20 ft. 4 in.

Another interesting feature is the use of the telephone for train dispatching. The micro-telephonic apparatus is placed in a double wood box mounted on insulators with 3-ft. rubber tubes attached to the receivers. All telephone parts were thoroughly insulated and tested up to 50,000 volts. Electromagnetic induction is avoided by transposing the telephone wires for one-quarter of a turn at each pole. Electrostatic induction charges are also prevented by inserting self-induction coils between two wires of the line,

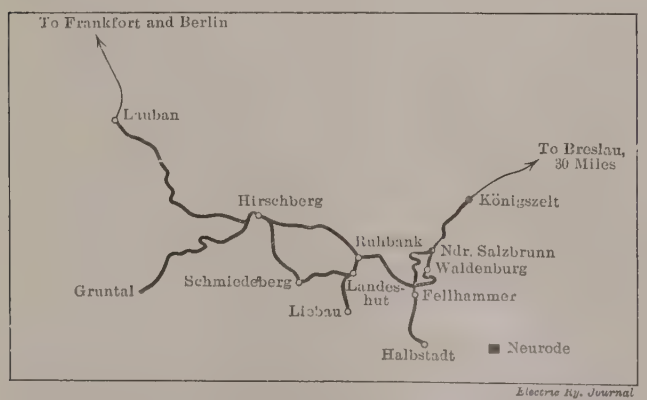
the center of each induction coil being grounded. The telephone currents have a frequency of about 500 cycles, so that they can pass through these coils only with difficulty. The telephone circuit is also protected by means of fuses and lightning arresters.

LAUBAN-KÖNIGSZELT LINE OF THE PRUSSIAN STATE RAILWAYS

Following the Dessau-Bitterfeld electrification, the Prussian State Railways were authorized to electrify during the present year the Lauban-Königszelt mountain division. This work, which is now under way, comprises about 124 miles in all, of which some 81 miles will be completed first along the main line and branches shown in the accompanying map. The following particulars on this undertaking were published in a general review of heavy electric traction writen for two recent issues of *Elektrische Kraftbetriebe und Bahnen* by Dr. W. Reichel.

These lines are adjacent to a coal-mining district, and it is stated that generating plants could be advantageously located at Neurode and Waldenburg. The freight locomotives will be driven through jackshafts by two motors mounted in the body, as indicated in the accompanying drawing. These motors will be rated at 1250 hp each on an hour basis. The driving wheels will be only 45.3 in. diameter because of the grades and large tractive effort required. The total weight per locomotive will be 94 tons, the electrical equipment alone weighing 46 tons. The specifications call for a maximum tractive effort of 35,200 lb. and a tractive effort of 18,040 lb. for one hour. In spite of heavy grades, a speed of 50 m.p.h. is specified. One sample locomotive is being furnished by the Siemens-Schuckertwerke and another by the Allgemeine Elektricitäts Gesellschaft.

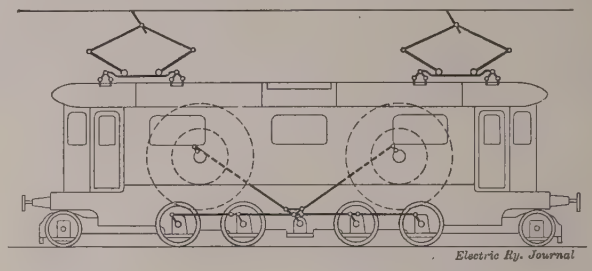
It is estimated that the complete Magdeburg-Bitterfeld Leipzig-Halle electrification will cost about $6,250,000, of which $4,875,000 will be required for the power station, transmission and overhead line and the rest for locomotives. It is estimated that the costs for the Lauban-Königszelt line, as given in the accompanying table, will range from $5,800,000 to $7,500,000. The government has granted $2,500,000 for transmission lines, substations and overhead lines and $1,850,000 for locomotives. The power house would cost about $1,375,000, but it has not yet been decided whether it should be built by the State Railways or by a



Map of Lauban-Königszelt Lines Which Are Being Electrified by the Prussian State Railways

private company which would sell energy on a kw-hr. basis.

Preliminary calculations showed that electrical service on the Lauban-Königszelt line would make the annual operating cost $725,000 against $825,000 for steam—a saving of 14.9 per cent. Even if the saving were only 7.5 per cent, electrification would be justified because it would permit better service over the heavy grades and improve the schedules. In making this comparison it was assumed that the operation of electric locomotives would cost only $3.73 per 1000 miles against $11.20 per 1000 miles with steam locomotives. In like manner the shop maintenance of electric locomotives was placed at $23.20 per 1000 miles as against $60.48 per 1000 miles for steam locomotives. The



Freight Locomotive for Lauban-Königszelt Line

cost of coal for steam locomotives was figured at $3.88 per metric ton (2204 lb.).

PRELIMINARY CALCULATIONS ON COST OF ELECTRIFYING THE LAUBAN-KÖNIGSZELT LINE.

Installation Costs:		
Power station, 18,400 kw, at $75 per kw (annual requirements for railway service, 36,800,000 kw-hr.)		$1,375,000
Four substations, 80,000/15,000 volts, 13,400 kva capacity, at $14 per kva		187,500
Feeders, 104.4 miles (two, each one large enough for entire load)		400,000
Overhead line, 15,000 volts, 322.4 miles total length, at $41.68 per mile		1,500,000
Locomotives:		
Twenty 1800-hp passenger locomotives and forty-one 2500-hp freight locomotives		1,850,000
Total		$5,312,500
Changes in telephone, telegraph and signal circuits		$500,000
Annual Performances:		
Train miles for high-speed passenger trains		176,422
Train miles for ordinary passenger trains		984,403
Train miles for freight trains		970,043
Total train miles		2,130,868
Annual Operating Costs:		
Personnel (118 motormen)	$107,500	
Current, at 0.69 cent per kw-hr., allowing 7 per cent loss in transmission lines and 8 per cent loss in contact lines	247,946	
Maintenance of transmission lines and substations	41,000	
Lubricants, at 3.25 cents per lb.	4.750	
Locomotive operation, at $3.73 per 1000 miles	8.016	
Shop maintenance of locomotives, at $23.20 per 1000 miles	49,835	
Maintenance of inspection cars	3,500	
Trolley line maintenance	13,613	
Total operating costs		$476,160
Fixed Charges, Funds:		
Amortization for rolling stock, 3 per cent	$53,340	
Amortization for contact line, 1.5 per cent	20,421	
Amortization for inspection cars, 3 per cent	2,100	
Amortization for changes in telephone, telegraph and signal circuits	7,500	
Total		83,361
Interest, 4 per cent on cost of rolling stock, line, inspection cars, shop shipment, changes in telephone, telegraph and signal circuits, superintendence of construction and general expenses		162,830
Total operating and fixed charges		$722,351

COMPARISON WITH OPERATION BY STEAM.

Train operating costs and fixed charges:	
By steam	$819,349
By electricity	722,351
Saving due to electricity	$97,098
Operation of lighting and miscellaneous installations:	
By steam	$56,142
By electricity	32,500
Saving due to electricity	$23,642

Total saving, $120,740, or approximately 15 per cent.

The report of the Swiss Government Railways for the year 1911 states that experiments with heavy electric locomotives are being continued on the Spiez-Frutigen line of the Berne-Lötschberg Railway. Only one 2000-hp locomotive furnished by the Oerlikon Company, of Zürich, is in use at present. Complete plans for the electrification of the Engadine line of the Rhaetian Railway have been made, and the builders have begun electrical construction.

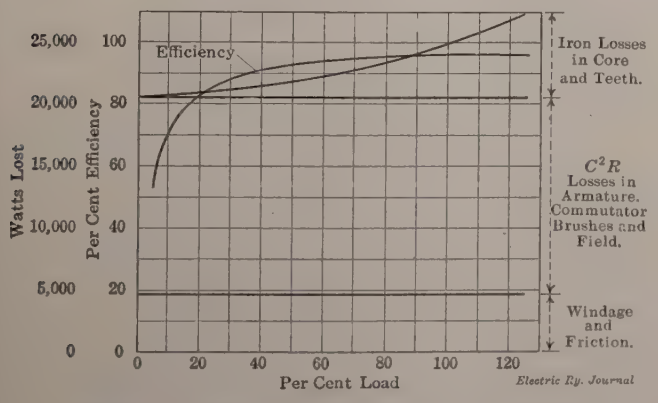
HIGH-TENSION D.C. TRANSMISSION IN ENGLAND

On June 12, 1912, J. S. Highfield described at the Glasgow meeting of the Institution of Electrical Engineers the 15,000-volt d.c. series transmission system used by the Metropolitan Electrical Supply Company, London, between its Willesden power station and Southall, a distance of 7 miles. Eventually the system is to be extended to a total length of 28 miles, when higher voltages may be used. The three present 5000-volt d.c. generators are driven by means of synchronous motors which are supplied by a.c. generators already installed. The high-tension direct current is then transmitted through two cables to the substation at Southall, where three 250-kw motor generator sets convert the transmitted energy to 3000 volts, 50 cycles. Provision is also made to supply smaller consumers by a three-phase, four-wire system with 415 volts between phases.

The d.c. generators at Willesden are six-pole machines, each with a 1439-segment commutator 60 in. in diameter by 6¾ in. long. The output of each machine is 500 kw at 100 amp and 600 kw at 120 amp. A turbine-type regulator, which is driven from the generator shaft, regulates the working field by moving the brushes from full-load to no-load position and at the same time shunts a part of the field current by means of a diverter.

These generators are, of course, carefully insulated from ground by being bolted to concrete blocks, which in turn are supported on stoneware insulators embedded in asphalt. The space around the beds is filled with bitumen. To limit the pressure that can occur between either pole of the machine and the frame a resistance of 0.8 megohm is fitted to the machine frame, the ends being connected across the terminals of the machine. As the center point of this resistance is connected to the frame of the machine, the total voltage between either pole and the frame is limited to half of that given by the machine, and an operator standing on the frame of the machine and touching one pole receives no more current than the high resistance allows to pass.

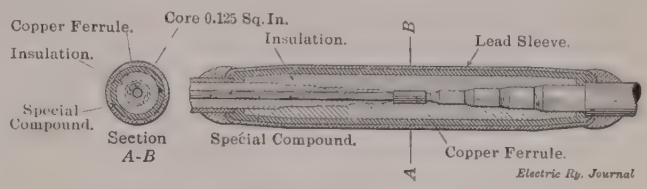
The two transmission mains consist of two plain lead-covered paper-insulated cables having a core of 0.125 sq. in. section with ½-in. paper insulation sufficient for 100,000 volts direct current. These cables are drawn into 2½-in. cast-iron pipes with pipe joints made with yarn and clay and electrically bonded by means of three corrugated iron wedges which enter the iron. Special split cast-iron boxes are used to hold each cable joint, and small split boxes are used at bends. The joints in the cable are made with paper



Efficiency Curves of 5000-Volt D.C. Generators

according to a method developed by the company for its 10,000-volt concentric cables. The joints were tested up to 150,000 volts, 60 cycles, without breakdown. The cables were tested up to 130,000 volts, 60 cycles, for five minutes; also at not less than 150,000 volts d.c. after they were laid. The Board of Trade has permitted the company to use the earth as an emergency circuit.

The grounding experiments were carried out to ascertain the best method of adapting the earth as a permanent conductor for industrial currents in such a way as to avoid interference with telegraph, telephone or other circuits. The experiments indicated that the pressure fall occurred very near the plates and that when the current was carried to a depth of only 10 ft. the pressure drop near the plate was



Sections of High-Tension D.C. Cable Joint

very small. Mr. Highfield said that where a very long transmission was required—say 100 miles—the advantage of grounding would be very great.

The actual operation of the plant is described as being exceedingly simple. The first generator is run up to speed by means of its starting motor, either with the mains open or on short circuit, and the regulator is set to give the proper line current. An incoming generator is generally started from the d.c. side and the motor paralleled into the circuit. The substation motors are started by opening the switch and rotating the brushes until full speed is reached, when the regulator is put into action.

The present safe limit of pressure on a single commutator appeared to be about 5,000 volts. Consequently, for a maximum line pressure of 50,000 volts, ten machines would be required, and if these are driven in pairs five units of plant would be required. It does not seem likely that these high-tension d.c. generators could be built to run at steam-turbine speeds, but a turbine drive is now available by the use of the Parsons double helical gear. Mr. Highfield believed that a very good plant unit would consist of separate high-pressure and low-pressure turbines, each driving by gearing one or two slow-speed generators and that the day would come when internal-combustion engines of large size would be used to supplement the steam turbine. For such work the d.c. series system offers special advantages, owing to the fact that it is independent of any ordinary speed variations and is clear of all the difficulties of parallel running.

The cost of a series d.c. power station, except when steam turbines are used, was said to be generally not more than that of a similar a.c. station. The cost of the substation plant is about the same as that of an a.c. motor-generator station working at any pressure suitable for direct use on the motors; if step-down transformers are required, the advantage would generally be with the d.c. station.

The transmission line is far less costly than a three-phase line of similar capacity. The actual cost of a line having a capacity of 10,000 kw, with one cable disabled, worked out at £1,600 per mile. This includes the two cables laid in cast-iron pipes and a telephone cable and the cost of the ground connections at each end. The cost of a single three-phase armored cable of 5,000 kw capacity at 20,000 volts, including cost of laying, was about £3,000 per mile, or twice the cost, without any provision for breakdown.

The author believed that for certain work the series system and series-wound constant-current machines possessed great advantages as to cost and convenience over other systems. For very long-distance transmission, especially where underground mains are necessary, it was possible where the a.c. system was not. Where energy had to be taken to a great city from a distance, whether from a water-power station or a steam station situated at the coalfields, the underground d.c. system also offered great advantages, as compared with the overhead a.c. system, in respect of security of supply and cost of maintenance. The system might be advantageously used for railway supply, especially where water-power is available, since it enables a very long line to be fed from a single power station.

EXPERIMENTAL SINGLE-PHASE EQUIPMENT FOR THE MIDI RAILWAY, FRANCE

According to an article in a recent issue of *London Engineering*, the Midi Railway of France has decided on an extensive electrification scheme in the neighborhood of Toulouse. It is now proceeding to convert some 175 miles of single track. In order to obtain an entirely satisfactory form of overhead construction, six sections of the line, each some 1½ miles to 2 miles long, have been equipped with as many styles of overhead construction for 12,000-volt, single-phase service. Two of these forms are of special interest, namely the design of M. Paul, chief engineer to the railway, shown in Figs. 1 to 4, and that of Vedovelli, Priestley & Company, presented in Figs. 5 to 8.

In the Paul arrangement a rigid girder-like structure takes the place of the more common semi-flexible conductor. This girder is made up in lengths of 39 ft., while the distance between the supporting pillars, or towers, is 164 ft. The girder is carried from a suspended steel catenary cable and is connected to it through insulators at the points formed by the joints between the various lengths. The normal height of the lower side of the girder above the running rails is 17 ft., rising to 19½ ft. at level crossings and falling to 14¾ ft. at some of the bridges and tunnels. These dimensions are general throughout the line.

The conductor girder is triangular in section, having angle irons at its upper corners and a round-bottomed rail at its lower corner. The angle irons and rails are fastened together with small riveted angle-iron latticework. The various lengths of the girder are built up complete in the shops, and on erection are secured together with fishplates

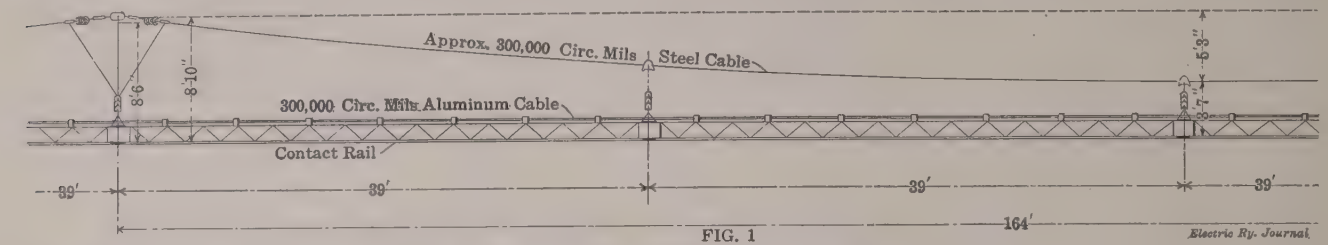


FIG. 1

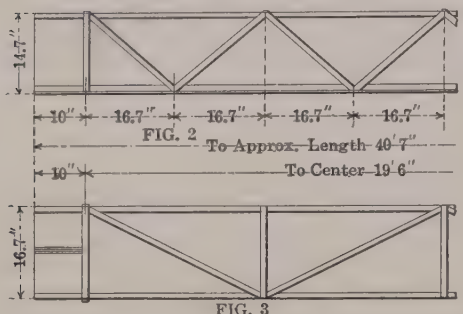


FIG. 2

FIG. 3

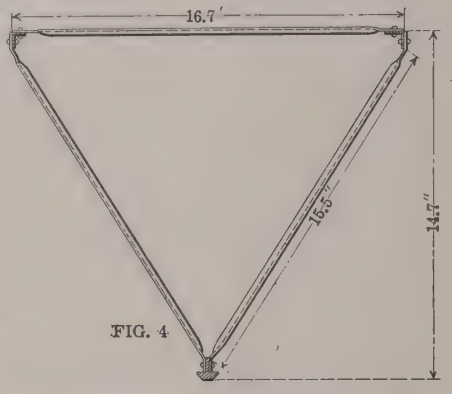


FIG. 4

Experimental Catenary for the Midi Railway, France

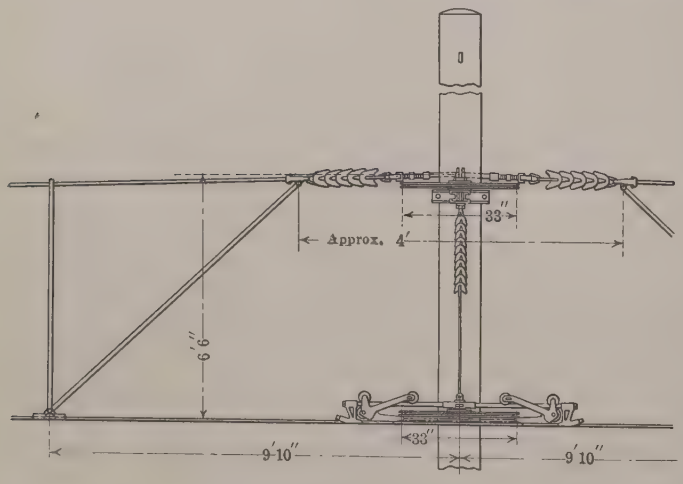


FIG. 5

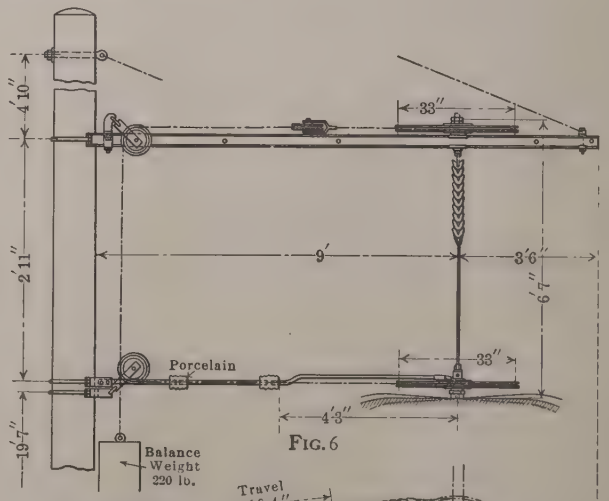


FIG. 6

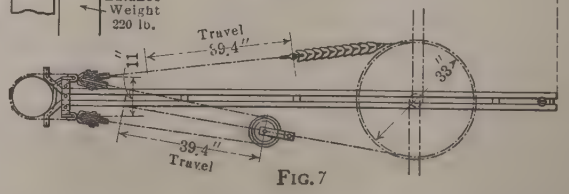


FIG. 7

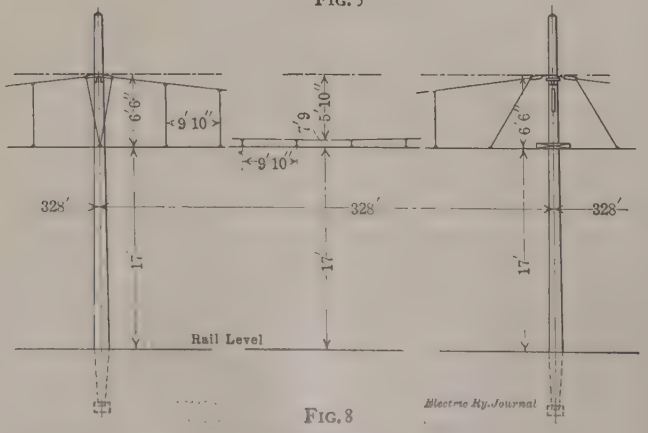


FIG. 8

Experimental Catenary for the Midi Railway, France

which have oval holes to allow for expansion and contraction. The conductivity of the girder is increased by running a bare aluminum cable along its upper side, this cable being connected to it at intervals by clips. No allowance for temperature difference is made in the suspending cables, as their expansion or contraction results only in the slight lifting or lowering of the position of the girder. It is obvious that the construction will present a very uniform surface for contact with the collector bow or pantograph, and that there will be no hard points at the places where the suspension wires are connected to it. The towers for carrying the line are built up with braced steel sections.

The Vedovelli-Priestley construction consists of a simple catenary suspension with hangers to connect the catenary with the copper contact wire. The steel catenary is attached to the contact wire by hangers, the vertical examples of which are small rigid bars of cruciform cross-section, while the inclined ones are round rods. The novel feature of this system lies in the compensating devices which are fitted to both the conducting wire and the catenary. These devices are not fitted uniformly throughout the line, since a trial is being made of different methods and combinations to ascertain the most satisfactory arrangement. Thus, in Fig. 8, the conducting wire near the left-hand supporting pole is attached by vertical hangers, while that near the right pole is attached by inclined ones. The two different arrangements are necessitated by the fact that the conductor wire close to the right-hand pole has a tension gear while that near the left-hand pole has none.

Two compensating systems are employed. In the first a weight suspended by a chain acting over fixed pulleys maintains a constant tension on both the catenary and the conducting wire. This arrangement is shown in Figs. 5 to 8. In the second a similar weight is employed, but it acts only on the catenary, the constant tension in the conductor wire being maintained by a pair of horizontal spiral springs which are installed on the brackets at the compensation points. The first tension gear consists essentially of a horizontal pulley carried by the fixed arm of the pole. This pulley has two diameters, one relatively small and the other of 33 in. The tension weight acts on the larger diameter through a chain and pulley system, as shown, while the catenary or conductor wire is attached to the small diameter in such a way that the pull of the weight on the larger diameter, tending to rotate the pulley, maintains constant tension.

Various poles, including reinforced-concrete designs, are being tried in connection with this installation. The insulators used for all positions of tension throughout both of the systems described are of the Vedovelli-Priestley spiral or helical groove type. These insulators are strung together by wire-rope links to form a chain of any length required to suit the voltage.

In a discussion by Reid T. Stewart before the American Society of Mechanical Engineers and given in detail in the April number of the *Journal* of that society, the fact was brought out that in commercial welded pipe the variations in thickness of wall, perfection of weld, and other features of manufacturing, give rise to variations in the bursting strength which are of sufficient magnitude to render unnecessary any great refinement in the use of formulas. Relative strengths of steel pipes and tubes were indicated to be as follows: For butt-welded steel pipe, 73 per cent; for lap-welded steel pipe, 92 per cent, and for seamless steel pipe, 100 per cent. In steel pipe the strength of the butt-weld appears to be about 80 per cent of that of the lap-weld. The relative strengths of wrought-iron and steel pipe appear to be as follows: Butt-welded wrought-iron pipe is 70 per cent as strong as similar butt-welded steel pipe; lap-welded wrought-iron pipe is 57 per cent as strong as similar lap-welded steel pipe.

CHANGES IN THE FIRM OF FORD, BACON & DAVIS

On July 1 Ford, Bacon & Davis announced that on that date the firm was enlarged by the admission to partnership of Charles F. Uebelacker, Charles N. Black and William von Phul. Previously the members of the firm, which was established in 1894, consisted of Frank R. Ford, George W. Bacon and George H. Davis. The main office of the firm is at 115 Broadway, New York. The principal branch offices of the firm are at 921 Canal Street, New Orleans, and 85 Second Street, San Francisco, each of which will be in charge of a resident partner.

Charles F. Uebelacker was graduated from Princeton University in 1889 as electrical engineer. For the next few years he was employed by various manufacturing and electrical concerns, having been chief engineer of the Short Electric Railway Company and the Brush Manufacturing Company of Cleveland, electrical engineer of the Consolidated Traction Company of New Jersey and later chief engineer and manager of the Peckham Truck Company, of Kingston, N. Y. In 1899 he become connected with the firm of Ford, Bacon & Davis, having in charge for them the operation of the Elmira Water, Light & Railroad Company as vice-president and general manager. In 1901 he joined the organization of the firm in New York and since 1902 has been its chief engineer.

Charles N. Black also graduated at Princeton University as electrical engineer in 1890. From that time until 1899 he was in the employ of electrical manufacturing companies in the design and construction of electric railway and electric lighting machinery, having been superintendent of the shops of the Brush Manufacturing Company, of Cleveland, and manager of the New Haven factory of the Westinghouse Electric & Manufacturing Company. In 1899 he became connected with the engineering organization of Ford, Bacon & Davis and until 1902 was its chief engineer. After the firm finished its work of reconstructing the Kansas City cable system into an electric railway, of which Mr. Black was in charge, he became vice-president and general manager of the Kansas City Railway & Light Company, continuing until 1907 when he assumed his present position of vice-president and general manager of the United Railroads of San Francisco.

William von Phul graduated from Tulane University in 1891 as mechanical engineer. During the next ten years he was general superintendent of the Louisiana Electric Light Company and of the Edison Electric Company of New Orleans and also of the New Orleans & Carrollton Railroad, Light & Power Company. He then took charge of the operation of the Cincinnati Gas & Electric Company as general superintendent, and since 1905 he has been connected with the engineering and operating forces of Ford, Bacon & Davis at New Orleans, being also vice-president of the American Cities Company.

A NEW RECORD IN BLOCK SIGNALING

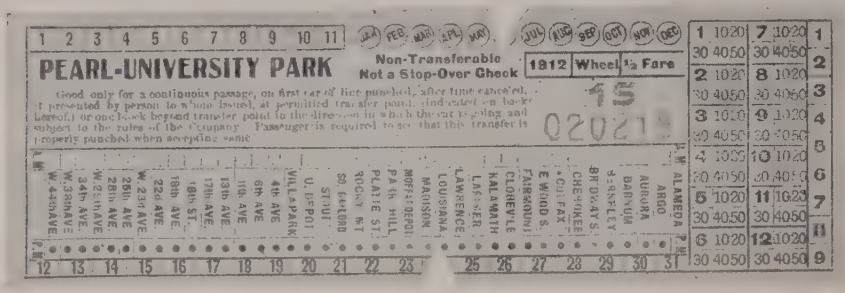
The Washington, Baltimore & Annapolis Electric Railway placed in service at 4 a. m. June 24 13.2 miles of single-track automatic block signaling with continuous a.c. track circuits on its division between Naval Academy Junction and Annapolis. This installation comprises nine a.c. track circuits, seventeen semaphore signals, sixteen light signals and two switch indicators.

J. J. Doyle, general manager of this railway, desired this signaling in service for the traffic incident to the Democratic convention, which opened on June 25. The contract was awarded on May 6 to the Union Switch & Signal Company. The first shipment of material arrived on the ground May 23, and the signals were in operation on June 21, allowing thirty working days for the complete installation. This establishes a record very gratifying to the companies.

TRANSFERS PUNCHED TO MINUTES IN DENVER

The Denver City Tramway Company has introduced a new type of transfer and a new method of issuing transfers. The following explanation of the system has been received from C. B. Wells, superintendent.

Under the former method of issuing transfers, the time punched was that at which the time of the transfer expired, and the conductor was required to add ten, twenty or thirty minutes to the time of his arrival at a given transfer point to allow sufficient time for a passenger to take his connecting car. The amount of time allowed was governed by the headway of the line to which the transfer was made. To punch transfers intelligently under that method it was necessary for a conductor to know the headway of more than forty city lines. As the headway is changed at different hours of the day to meet traffic conditions, the conductors had to have good memories.



New Transfer in Denver

Under the new system the conductor punches the time at which he arrives at the transfer point. Hence he has to keep in mind only the running time of the line upon which he is operating. The transfer is accepted upon the first intersecting car which passes the transfer point. In case the distance the passenger is required to walk between cars should be two blocks, ten minutes is allowed. If the distance is three or more blocks, a fifteen-minute leeway is provided. In cases of congested traffic conditions, where a passenger is unable to board the first car, the conductor of the following car is authorized to accept the transfer, even though the time may have expired.

A sample transfer is illustrated. The time numerals are at the right of the ticket and the conductor can indicate the exact time of his arrival at a point by punching the proper ten-minute interval and then by punching one of the numerals in the vertical column at the extreme right of the ticket. All transfer points are printed on the back of the ticket for the benefit of patrons and the information of conductors. Other instructions regarding the acceptance of transfers are also printed on the slips and help to prevent mistakes.

The company has started a campaign to secure greater accuracy in the punching and receiving of transfers. Every error detected is taken up promptly with the conductor responsible.

HEARING ON T-RAILS IN NEW HAVEN

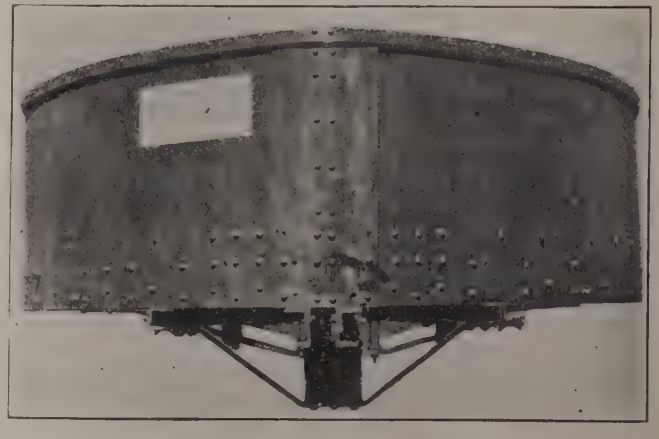
The Public Utilities Commission of Connecticut conducted a hearing June 26 at Hartford on the subject of whether grooved rails or T-rails should be laid on a spur track on Grand Avenue in New Haven. The New Haven system is laid throughout with T-rails, and the arguments on both sides were upon the relative merits of T and grooved rails for the entire system. Among the witnesses for the city were Mayor Rice, City Engineers Ford and Kelly, Nelson E. Lewis, chief engineer of the Board of Estimate and Apportionment of New York, and Charles N. Slocum, for twenty-six years city engineer of Springfield, Mass. For the railroad there appeared General Manager John K. Punderford, Robert A. Cairns, city engineer of Waterbury; Henry C. Allen, city engineer of Syracuse, N. Y.; John M. Farley, a consulting engineer of New York city; George K. Crandall, city engineer of New London; Charles E. Minor, city engineer of Greenwich, and Paul Nash, director of public works and formerly city engineer of Stamford.

The complaint of the city was that the pavement in the principal streets became rotted just inside and outside the rails, and that this made the use of the streets dangerous for vehicles. The defence of the company was that if pavements were properly laid they would stand up as well next to T-rails as to grooved rails and that in other cities the T-rails had proved perfectly satisfactory. This testimony was corroborated by Robert A. Cairns, city engineer of Waterbury, in regard to that city; by Henry C. Allen, city engineer of Syracuse, in regard to that city; by George K. Crandall and by the other city engineers called by the company. Documentary evidence was also submitted to support the position taken with respect to the type of rail to be used in the reconstruction.

SEMI-STEEL PARABOLIC END CARS FOR THE ONEIDA RAILWAY

The Oneida Railway, which operates an electric passenger car service between Utica and Syracuse, N. Y., over the tracks of the West Shore Railroad, has now under construction at the works of the G. C. Kuhlman Car Company two semi-steel cars which are notable for the use of a parabolic front end. The object of this design is to diminish the wind resistance of the car to obtain the appreciable reduction in energy consumption that may be expected in high-speed service. The framing of the car has also been designed with a view to securing the least weight consistent with heavy service.

The cars, which are of the single-end type with step on one side only, will seat fifty-seven persons. Their principal dimensions are as follows:



Parabolic Front of Oneida Car Framing

Length of body over corner posts	40 ft.	0	in.
Length of body over platforms	52 ft.	3½	in.
Length of parabolic front	7 ft.	3	in.
Length of rear vestibule	5 ft.	0½	in.
Length of smoking compartment from outside of corner post to center of partition	11 ft.	9	in.
Length of passenger compartment from outside of corner post to center of partition	28 ft.	3	in.
Length of observation compartment	7 ft.	3	in.
Length of motorman's cab	7 ft.	5 9/16	in.
Center to center of bolsters	31 ft.	2½	in.

Center to center of side posts	2 ft.	9	in.
Width of body over sills, including panels	8 ft.	4	in.
Width over side posts above belt rail	8 ft.	4	in.
Extreme width of car	8 ft.	6	in.
Height from top of rail to top of trolley board not to exceed	12 ft.	11½	in.
Height from top of rail to center of drawbar		34½	in.

The bottom framing is of steel channels and I-beams. A paneling of 3-16-in. plate is used below the windows, and ash framing is used above, except that the letter panels are of No. 12 sheet steel and the face of the posts of No. 14 sheet steel. The roof is of the plain arch design reinforced with steel carlines, ½ in. x 1½ in., to support the full-length trolley board. The headlining is of Gardner artificial lumber. The roof carries fourteen automatic ventilators.

The two center sills are composed of 8-in. channels weighing 11.25 lb. per ft. The two intermediate sills are 6-in. I-beams weighing 12 lb. to 25 lb. per ft. The crossings

Side and Bottom Framing of Oneida Car

are of 4-in. channel, 5.25 lb., eighteen in number. Six of these are reinforced with a lower chord of 4-in. 5.25-lb. channels, four of which are used for needle beams and two for end sills. The remaining twelve crossings have no reinforcement. All crossings are filled with hard wood to permit the installation of a 13-16-in. yellow pine flooring, which in turn is covered with interlocking elastic tiling. Each crossing is attached to the longitudinal members by rivets and gusset plates of 3-16-in. steel. The side sills and the panels below the windows are riveted together as well as being riveted to the ends of the cross members and gusset plates. Other details are shown in the view of the framing. The bolsters are made of steel plates with 1-in. x 10-in. top and bottom members which are separated by cast-iron spacing spools or blocks. The under-trusses are made of ½-in. round iron fastened to the sills and extending from bolster to bolster.

The flooring of the rear platform is level with that of the car body interior, and its 2-ft. 6½-in. opening for the step is fitted with an Edwards steel trapdoor. The two windows in the end and on the closed side of the vestibule have top stationary sashes, which are equipped with brass stiles and African mahogany top and bottom rails. The lower drop sashes are similarly framed. The vestibule is also furnished with a door arranged to swing inward against the rear bulkhead of the car. The door of the rear bulkhead has a 30-in. opening and is fitted with drop sash. This door swings in the passenger compartment against the toilet room.

The body of the car is divided into a passenger compartment, smoking compartment, observation compartment, motorman's cab, heater room and toilet room. The interior finish is of African mahogany with narrow inlay lines of white holly and brushed brass trimmings.

Each pair of double windows has stationary upper sashes, and lower sashes which are arranged to raise. Like the other sashes in this car, the stiles are of brass and the rails of African mahogany. The lower sash is fitted with Edwards sash fixtures. The motorman's cab sash also has the upper part stationary, but the lower part is arranged to drop. The window fittings in general consist of Pantasote curtains and the Curtain Supply Company's No. 88 ring fixtures. Brackets are provided for storm sash. The motorman's cab is placed at the forward right-hand side of the car. It has one single swing door 18 in. at the rear hinged on the smoking room side and arranged to swing into the cab and against the heater room door. The heater room is of mahogany lined with ¼-in. hard asbestos in such a manner as to protect the wood from excessive heat. The heater, which is of the Peter Smith I-C type, is placed on top of a coal box. The ceiling of the heater room is provided with a ventilator.

The seats are of Hale & Kilburn manufacture, most of them being of the reversible cross-seat type. Royal Wilton covering is used to upholster the seats in the passenger compartment and leather for those in the smoking and observation compartments. All cross seats are 37½ in. long over the mahogany arm rest and have a cushion not less than 33 in. long. The seats are spaced 33 in.

Among the minor outside fittings of these cars are deflecting copper gutters, a brass car-record holder, Pullman grab handles, five standard signal brackets on each end of the car and perforated dash sign boxes. The car bodies are mounted on Brill No. 27 M.C.B-2 trucks. The following are the principal data in connection with the trucks:

Radius of shortest curve, inside rail	35 ft. 0 in.
Wheelbase of truck	6 ft. 6 in.
Type of motors	GE-73 or equivalent
No. of motors per car	4
Tread of wheels	4⅞ in.
Diameter of wheels	37 in.
Flange of wheels	⅞ in. x 1¼ in.

The following is a list of the braking and other operating fittings: hand brakes with Lindstrom handles; air brakes, Van Dorn couplers at each end; 12-in. Dedenda platform gong; locomotive pilot fender with removable sheet steel wings for use in winter; Ohio Brass "Universal" sander with galvanized hopper under motorman's cab and emergency tool cabinet.

In addition these cars are equipped with the usual appurtenances for interurban service such as parcel racks of brushed brass, water-cooler and tank and match scratchers in the smoking compartment. A push-button system has also been installed for the convenience of passengers.

NON-PARALLEL AXLES FOR DOUBLE-TRUCK CARS

Non-parallel axles on single-truck cars have been in regular use for some time past, especially in Europe, where electric railway speeds are low and curves are sharp. Recently, however, the non-parallel axle principle has been applied to a double-truck car for trial on the Paris Metropolitan Railway. The installation is a development of the Warner truck, which is manufactured in this country by the St. Louis Car Company and in Europe by the Warner International & Overseas Engineering Company, of England. The latter company has made the trial installation with the expectation that it would absolutely eliminate all of the "nosing" action which is common with double-truck cars operated at a high speed. In addition, it is expected that the practically perfect flexibility will effect an appreciable reduction in power required to drive the car, not only on curves but upon straight track as well.

The general principle on which the design is based is similar to that of the standard Warner single radial axle truck, which was described in the Electric Railway Journal for Oct. 9, 1909, the radial motion being obtained by hanging the moving parts by links whose pins are fixed radial to the desired center of rotation. The designers have, however, gone further away from standard practice in the bogie truck design and have eliminated the center bearing, replacing it with two swing-link supports, one on each side of the truck and set radial to the center. A positive radial action for the axles is also obtained by using auxiliary frames, which carry the springs, pedestals and boxes and are pivoted to the center pin. As these auxiliary frames hold the axles rigidly with relation to themselves, the wheels are prevented from moving sidewise except along the arc of a true circle which has the center pin for a center and do not depend for alignment upon the moment exerted by the short pins in the supporting links.

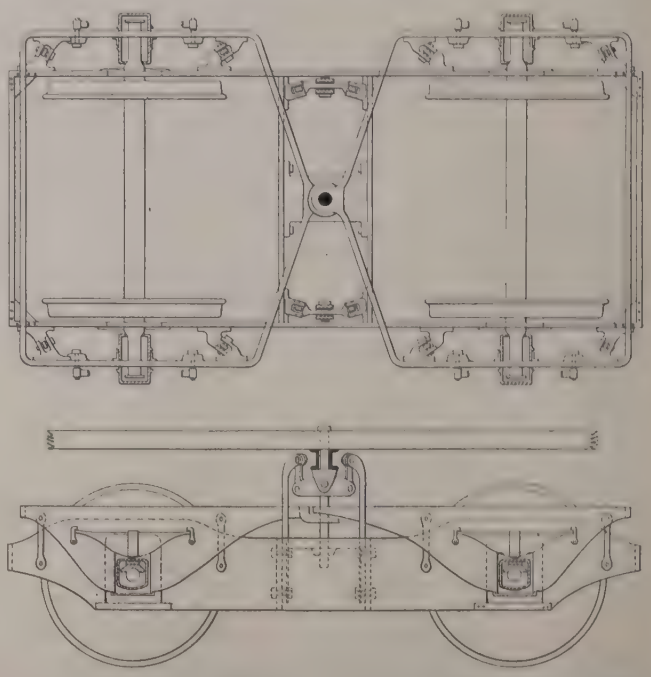
Owing to the complication of an actual assembled drawing of one of these radial axle bogie trucks, the accompanying conventional line cut has been prepared to show the general principle of operation. The supporting links at each side of the truck which carry the weight of the car through the channel-iron body bolster, and which take the place of the customary center bearing, are shown in the conventional drawing attached to long posts curved over at the top. In the actual construction these posts are very short and the body sills and bolster are much lower than shown.

In other respects, however, the actual construction is generally in accordance with the cut. The horizontal member between the two main supporting links is fulcrumed to a casting riveted to the body bolster at the place ordinarily occupied by the side bearing. This horizontal member serves as an equalizing lever so that the truck can tilt up at either end in passing over rough track. As the two points of support between the truck and the body bolster, one at each side of the truck, are widely separated, a very small angle of rotation of the truck around the center pin will cause quite a marked deflection in the two sets of main supporting links. One pair will swing forward and the other backward, and as the angularity of the links increases, a tendency for the truck to return to its normal position in line with the car body is established. This tendency toward keeping constant alignment between the truck and the car is introduced for the purpose of eliminating "nosing" and for producing easy running on straight track. Incidentally it practically prohibits "slewing" of trucks in a derailment. Referring to the plan view, it will be seen that these links as well as the links between the main and auxiliary truck frames are set so as to swing on lines tangent to circles described from the center pin of the trucks.

The center pin shown in the cut serves as a pivot for the truck as well as for the auxiliary frames. The castings in which it is inserted both in the body bolster and in the truck are installed only to hold the pin in position. Neither one carries any weight nor do the two castings even bear upon each other. They are held apart by the main supporting links and clear each other at all times. There is no center bearing.

From the horizontal equalizing levers previously mentioned the weight of the car is transmitted through the main supporting links to a pair of posts or brackets which are riveted to cross members of the truck frame. These cross members are somewhat equivalent to the transoms in a standard truck. They transmit the load to the side members of the main truck frame. As shown in the conventional drawing, the side members of the truck frame are attached by swinging links to the auxiliary truck frames, or, in other words, the main frame with its load hangs like a pendulum from the auxiliary frames, which in turn are supported by the wheels through springs in the usual manner.

The wheels, axles and journal boxes are practically standard. The boxes slide vertically in pedestals on the auxiliary frames and take the load from leaf springs with spring hangers attached to the sides of the auxiliary frames.



Conventional Arrangement of Non-Parallel Axle Bogie Truck

Thus the wheels are held rigidly in the auxiliary frames except for such vertical motion as is permitted by the springs. The main frames are cut away where the axles pass through them, leaving large openings in which the axles may move freely about.

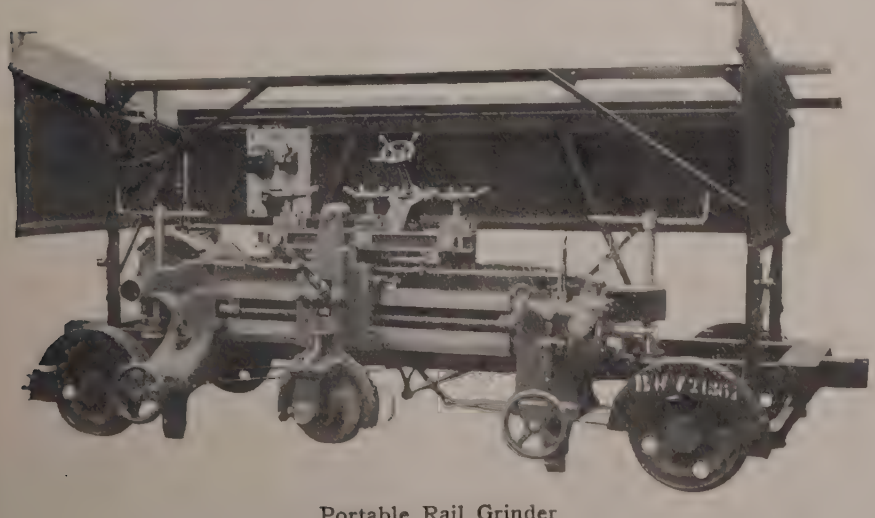
Since the auxiliary frames are connected to the main truck frame only by swinging links, any side thrust or blow from the rail at the wheel flange causes the wheels and the auxiliary frame to move with the pressure, out of line with the main frame. Then, since the auxiliary frame is pivoted on the truck center pin, this pressure sideways necessarily produces motion along the arc of a circle, and consequently the wheel whose flange receives the side thrust moves not only inward but also ahead. The wheel on the other side of the auxiliary frame, of course, moves sideways with the frame, but as the motion is radial about the center pin, it is compelled to move backward as well. The result is that whenever one wheel crowds against its rail, that wheel moves ahead and the opposite wheel moves to the rear and the pair of wheels and the axle consequently tend to roll toward the opposite rail as they no longer stand square with the track. It is manifestly impossible for a wheel to grind

against its rail as the first pressure applied to the flange causes the wheel to move away. In going around curves, this fact makes the radius of curvature unimportant. The wheels simply swing until the flange pressure becomes negligible, and in order to permit the condition the wheels tend to stay square with the rails at all times.

The illustration shows only a trailer truck. Motor trucks are exactly similar in principle but differ in that the auxiliary frames are not pivoted about the center pin by an extension of one side as shown. The pivoting is accomplished by means of the supporting lugs of the center-hung motors. The motors are supported in the usual manner by axle bearings at one side and by a supporting lug cast integral with the motor frame at the other. This lug is pivoted in a jaw casting attached to the cross member of the main truck frame. A vertical pin holds the motor lug in place in the jaws and compels the wheels and consequently the auxiliary frame to rotate about it instead of the truck center pin as in the case of the trailer truck. The former pins are set so close to the center line of the truck that the effect produced is practically the same as if the truck center pin was used as a center. Spiral springs separate the lug on the motor frame from the jaws of the casting on the truck frame and this permits free movement of the lug in the jaws.

A GERMAN RAIL GRINDER

The accompanying illustration shows a portable machine built by the Ernst Schiess Company, Düsseldorf, Germany, for use as a rail-joint grinder and remover of corrugation. It is carried on four flange wheels with coupling arrangements which permit it to be moved readily by a motor car. The emery grinding wheel which traverses the carriage for any travel up to 39.4 in. has an automatic reverse and is fitted with all the necessary screws and other adjusting means to permit grinding at any angle which may be presented by uneven rail wear. This emery wheel, which is about 14 in. in diameter, has a profile made to correspond to that of the rail, thus preventing any mutilation of the rail section. The wheel is belt-driven from an 8-hp to 10-hp motor which receives energy at the trolley voltage. Wedges

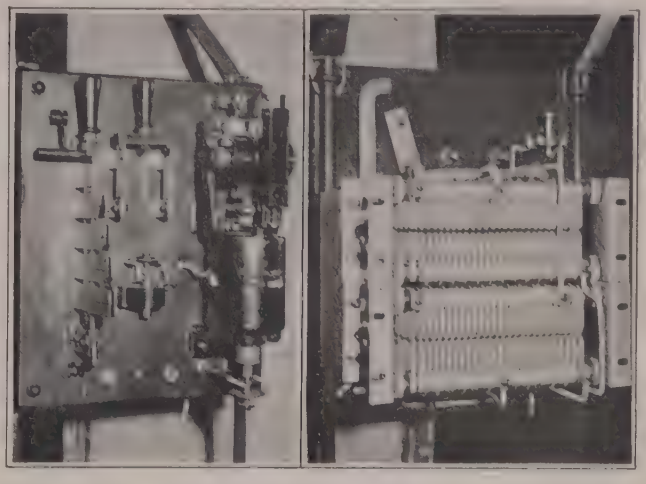


Portable Rail Grinder

are set in the rail grooves and other devices are provided to insure the firm setting of the machine. Two men are required to operate this grinder. The average time for grinding a joint is 7.5 minutes, as compared with 50 minutes for inferior hand filing. The weight of the complete equipment, except motor and cover, is 61.60 lb. Among the German cities in which this grinder is used are Düsseldorf, Frankfort-on-Main, Hanover, Chemnitz, Dortmund and Berlin. It is also used in England and Sweden.

A SIMPLIFIED D. C. MOTOR STARTER

The accompanying illustration shows a Westinghouse type "S" starter for constant speed d.-c. motors which is so fully equipped with all necessary protective devices that the most inexperienced operator can use it with perfect safety to the apparatus. The magnet switch serves to open and close the circuit and its blow-out coils prevent injurious arcing. In conjunction with interlocks and the over-



Motor Starter and Resistance

load relay this switch also affords low-voltage and overload protection. The two-pole line switch serves to disconnect the motor and starter from the line completely. The multipoint starting switch is used to cut out the starting resistance in several steps. This switch has an interlock contact at each end, one of which must be closed before the magnet switch can operate. With the starting switch wide open, the operator closes the line switch and then closes the starting switch step by step while he holds its upper interlock closed. Owing to the action of the two interlocks mentioned he cannot start until all the resistance is in circuit nor can he leave the motor operating with part of the resistance still in circuit. When closed the starting switch holds the upper interlock closed.

An overload either while starting or while running operates the relay, causing the magnet switch to open the circuit. Failure of voltage also opens the magnet switch. In either case the starting switch must be completely opened, placing all the starting resistance in circuit before the motor can again be started. To stop the motor, it is necessary only to pull out the starting switch enough to release the upper interlock. The circuit would then be opened by the dropping of the magnet switch.

All the switches, relays and interlocks are compactly mounted on a slate panel which has suitable support for floor mounting. In most cases the starting resistance is mounted on the rear of the panel, but when large and heavy it is separately mounted. The starter is made for 115-volt motors of from 10 hp to 60 hp, 230-volt motors of from 12½ hp to 125 hp, and 550-volt motors of from 30 hp to 250 hp.

A contract has been concluded between the Chinese government and E. K. Howe, representative of the Robert Dollar Company, Shanghai, China, for the construction of the electric lines in Hankow, China, including paving.

LONDON LETTER

(From Our Regular Correspondent)

The installation of electricity on the first section of the London & North Western Railway to accommodate the growing suburban traffic has been completed, but steam power will be used until the entire line is equipped for operation by electricity. Two new tracks have been installed from Kensal Green Station to Harrow, and the remainder of the line from Harrow to Watford will probably be completed by Jan. 1, 1913. It was intended to install electricity from Euston to Watford, but the question of a change in motive power on the portion of the line from Queen's Park Station to Euston is in abeyance, it having been decided to extend the Bakerloo tube from Paddington to Queen's Park and connect the London & North Western Railway with that line. The London & North Western Railway operates the North London Railway, which it is proposed to electrify from Chalk Farm to the city station at Broad Street. This work will involve extensive widening and it will be some years before it is completed. Some new stations have been built by the London & North Western Railway and all of the existing stations have been enlarged and modernized.

As soon as the necessary road-widening operations have been carried out the construction of tramways from the terminus of the Bolton Corporation's system from Horwich through Adlington, Chorley and Bamber Bridge to Preston, a distance of 16 miles, will be commenced. When completed these tramways will link Preston with Bolton, Manchester, Liverpool and a number of other towns in Lancashire.

In the annual report of the Leeds Corporation Tramways J. B. Hamilton said that the railless traction route had been satisfactory from an operating standpoint. The revenue from the date of opening a year ago to March 31 amounted to £1,508. About 230,000 passengers had been carried during this time.

The report of the Bradford Corporation Tramways, presented about the same time, shows a loss of £48 for the trackless trolley for the nine months to March 31, 1912. The income was £848, or 7.15d. per car mile; the operating expenses, £786, or 6.62d. per car mile, and the charges for interest and sinking fund amounted to a total of £110, or 0.93d. per car mile.

Deputations from other cities and boroughs continue to visit Leeds and Bradford to study the trackless trolleys. A recent deputation represented the Town Council of Ayr, and the report of the burgh surveyor favored the trackless system. He estimated that it would cost not more than £4,500 to equip the road to the racecourse. The Town Council, however, has decided not to adopt the suggestion, but to extend the present railway system at a cost of between £16,000 and £18,000. The Council has Parliamentary power to build an extension of the present system, while it would be necessary to obtain new powers to construct the trackless system.

Albert Stanley, managing director of the Underground Railways Company and a director of the London General Omnibus Company, has announced that it is intended to increase the number of motor buses in operation in London from 1750 to about 4000 a year hence. Four other companies operate about 200 buses in London.

The gross revenue of the Glasgow Corporation Tramways for the past year amounted to £987,280, an increase of more than £41,000 over 1911. Good weather and the Scottish Exhibition assisted to this satisfactory result. From June 1, 1911, to December 10, 1911, the two-stage fare was in operation. On the latter date the length of the halfpenny-fare stage was doubled and the report on this experiment is awaited with interest. The number of halfpenny tickets issued for the year just ended was 121,000,000, compared with 66,000,000 in the preceding year. Offsetting this increase, however, there was a reduction of nearly 26,000,000 in the penny tickets issued. The sales of tickets for the other stages remained about the same.

The tramways committee of West Ham has contracted with the electricity committee to supply current at 3 farthings per unit, a reduction of more than 20 per cent on the rate charged since 1909. This is the result of the investigations of a committee of the Municipal Electrical Tramways Association and the Municipal Tramways Association, which are endeavoring to reduce the cost of tramway operation by standardizing the price charged for current and have agreed on a basis of calculation based on the cost of production. The municipalities are giving their patrons the benefit of their profits by reducing fares instead of transferring the profits to rate account for the reduction of taxes.

The London County Council has replied to the Roads Improvement Association on the subject of alleged congestion and obstruction of streets by tramway traffic. The Council has compiled information to show that if electric cars were withdrawn entirely from the streets and the same seating accommodation was provided by motor buses it would be necessary to have double the present number of omnibuses in fine weather and between three and four times as many vehicles in wet weather, as in inclement weather omnibuses carry practically all passengers inside. The Council considers that the congestion in main thoroughfares is caused largely by other vehicles, which should be compelled to keep to the side of the road. When the maximum service of cars is in operation 462 cars an hour pass through the Elephant and Castle junction. If the present tramway service was abolished 988 omnibuses an hour would be required in fine weather in addition to the present service, and more than 2000 would be needed in inclement weather.

The Council has scored a victory over the commissioner of police of London in the decision of the select committee of the House of Commons which decided to allow the Council to run trail cars. The question of operating trail cars has been under consideration for some years, but the use of such cars has always been opposed by the police authorities, who contended that these vehicles would obstruct traffic. Three years ago the police commissioner consented to the use of trail cars for a limited time in the early morning and evening. The experiment proved successful, but owing to the attitude of the police the use of the cars was abandoned. The Council then sought Parliamentary powers.

The London, Brighton & South Coast Railway has opened its electrified section between Peckham Rye and Tulse Hill. This line is only 3 miles long but is of great importance as it connects the company's already electrified South London line with Victoria and the Crystal Palace. One line proceeds from Tulse Hill to the Crystal Palace and the other proceeds from Tulse Hill to Streatham Hill, Balham and Wandsworth Common. This new section makes accessible many southern suburbs which have long been isolated from London Bridge and Victoria. It is understood that the company will postpone for the present the plan which it has had under consideration for the electrical equipment of the line to Croydon.

The London & South Western Railway, which has not yet done any electrification work, has been asked by the Chertsey Urban Council to proceed with the electrification of its Thames Valley line. The Council was advised that the subject was receiving consideration and that the prospects were good for carrying out this work in the near future.

The directors of the Central London Railway have been approached by a deputation from the Twickenham railway facilities committee which presented a petition signed by 4000 residents inviting the company to extend its line to the Thames Valley. Reference was made to the large and increasing number of visitors to Kew Gardens, Hurst Park, Kempton Park and other places. Mr. Parshall, managing director of the company, stated that the directors had decided to give the matter their immediate attention.

The Chester Corporation, which has adopted a scheme for generating electricity by water power obtained from the River Dee on the site of the famous Dee mills, has received the sanction of the Local Government Board. The supply of electricity thus obtained will be auxiliary to that derived from the Corporation's power station, and it is estimated that a considerable economy will be effected as compared with extending the existing works. The loans sanctioned amount to £14,000, of which more than £7,000 is for turbines and dynamos and more than £5,000 is for buildings.

A. C. S.

News of Electric Railways

Court Decision in New York Clearing Way for Rapid Transit Operating Contracts

In a decision handed down on June 29, 1912, the Court of Appeals of New York sustains the lower courts, including the Appellate Division, which refused to enjoin the city of New York from entering into the proposed agreement with the Interborough Rapid Transit Company or the Brooklyn Rapid Transit Company on the ground that the concession of preferential payments was unconstitutional. The decision clears the way for closing up the pending subway deals. The prevailing opinion was written by Judge Hiscock and was concurred in by Judges Haight, Vann and Collin. The greater part of Judge Hiscock's opinion is devoted to a consideration of the objection urged to the proposed contracts that they are in violation of the constitutional provision prohibiting a city from lending its money, property or credit, and that therefore the rapid transit act itself, which concededly authorizes these contracts, is unconstitutional and void. Judge Hiscock at the outset makes it plain that the court has no power to review the wisdom and benefits of these contracts, its only power being to decide whether the Legislature had the power to authorize them. Referring to the contracts, he says:

"If the municipality and the various officials acting in its behalf have the power to make them, the questions whether it is wise to do so and whether their terms are advantageous for the municipality and public are solely for the consideration and decision of those officials. After all the criticism and discussion which have been directed at the present transit situation in New York it is only just and reasonable to assume that public officials charged with the duty of bettering that situation have entered on their task with care, all the wisdom and foresight at their command, and with complete devotion to public welfare. But, even if we should doubt whether they have reached the best possible solution of a great and perplexing problem, our sole and only duty still would be simply to determine whether the Constitution permits the legislation and contracts in question, and there again it is to be remembered that our duty is to be so discharged, if possible within fixed principles of law, as to uphold rather than condemn the legislation and the proposed action of the various state and municipal authorities thereunder."

The judge takes the decision of the court in the Sun Publishing Company case upholding the validity of the construction of the present subways at municipal expense as the basis for his reasoning that it is within the power of the Legislature and public officials to make the present contracts if they see fit to do so. That case decided that the municipality might expend its funds in constructing subways and then might make a lease of them. Following from that point the present decision holds that the city has the power to make a contract for the building and leasing of new subways and to provide that out of their earnings the Interborough Rapid Transit Company may take repayment of the sums contributed by it toward their construction and equipment; also that the city has a right to contract with the Interborough company for a modification of the latter's lease of the old subways in the interest of the public so that they and the new ones may be operated as a single system for a single 5-cent fare and that it may consent that the company take from the earnings a sufficient sum each year to repay it for the advantages which it loses and which the city gains by the modifications of the lease; also that it is proper for the city to take its rent under the new lease by a division of the proceeds after making payments agreed on instead of by a fixed annual sum.

In the case of the contract with the Brooklyn Rapid Transit Company it is held that the city instead of spending the enormous amount of money necessary to construct subways all over the Brooklyn territory may construct them over part of such territory and then make a lease with the Brooklyn Rapid Transit Company of the subways wherein said latter company agrees that it will operate its own system in connection with the subways for a single fare so as to cover the entire territory, and that it may allow the Brooklyn Rapid Transit Company what is regarded as a proper consideration for the benefits thus secured by the municipality in behalf of the public in the way of rapid transit facilities. In general, Judge Hiscock and those concurring with him hold that the municipality does not in the case of either contract give or lend any money or credit or enter into any illegal partnership with the proposed lessees, but that the contracts are such as the Legislature has the power to authorize for the purpose of securing rapid transit facilities, and that the payments allowed to the companies are such as the public officials have the right to allow if they see fit as compensation for the benefits and accommodations which are being secured in behalf of the city and the public.

The substance of the contract with the Interborough Rapid Transit Company follows:

1. The Interborough Rapid Transit Company to equip the lines proposed for operation by it in the report of June 5, 1911, to contribute $50,000,000 toward the construction thereof, to equip the same at an estimated expense of $21,000,000, and when constructed and equipped to maintain and operate such new lines for a term of forty-nine years from the time when operation of the new lines begins in conjunction with the existing subway system for a single 5-cent fare.

2. The leases of the existing subways (Contracts 1 and 2) to be leveled, so that the subways constructed under those contracts and the new subways will fall into the city's possession at one and the same time.

3. The new lines to be subject to recapture at the end of ten years, in accordance with the provision of the rapid transit act. This recapture may be exercised either directly by the city or through a new contractor. Provision to be also made for exchanging part of the new subway lines for part of the old, so that in the event of recapture the city may take over a complete east side or a complete west side line.

4. The so-called Belmont Tunnel, extending under Forty-second Street and the East River to the borough of Queens, to be turned in as part of the general system at a valuation of $3,000,000.

5. The receipts from existing and new subway lines to be pooled, and from the gross receipts of both lines there are to be deducted and paid in the order named:

(a) Operating expenses including damages for accidents, provision for depreciation, renewals and obsolescence; taxes, insurance and rentals payable to the city under existing subway contracts and amortization and brokerage charges.

(b) A sum to be retained by the company amounting to $6,535,000 per annum, representing the average annual income received by it from the operation of the existing subway lines and equipment for the two fiscal years ended June 30, 1911.

(c) A sum equal to 6 per cent upon the new investment of the Interborough Rapid Transit Company in the new lines, estimated at $77,000,000, or $56,000,000 for new construction and $21,000,000 for new equipment. This with the present investment of the company in the existing subways, estimated at $48,000,000, would bring its total investment in the new and old lines to $125,000,000.

(d) To be paid to city interest and sinking fund upon the bonds issued by the city for the construction of new lines, and in addition such further sum as would bring the payments to be made to the city up to an amount equal to 8.76 per cent upon its capital investment in the original construction of the new subways.

(e) Any amount remaining to be divided equally between the city and the company, share and share alike.

All the above amounts are to be paid in the order named and are cumulative; that is, if there should be a deficit in any item in any given year, that deficit must be made up from future earnings before the distribution proceeds.

6. Future subway extensions required by the city may

be added to the new system and will be equipped by the company as part of the entire system under a separate accounting system, based upon the per passenger method of apportionment.

7. The company to third-track and extend the elevated lines leased by it from the Manhattan Railway.

The contract to be entered into with the Brooklyn Rapid Transit Company will include the following terms:

1. The Brooklyn Rapid Transit Company or the Brooklyn Union Elevated Railroad, or a company to be formed in the interest of the Brooklyn Rapid Transit Company, is to equip the lines proposed for operation by it in the report of June 5, 1911, and when constructed and equipped to maintain them for a term of forty-nine years in conjunction with the existing railroad system owned and operated by the Brooklyn Union Elevated Railroad Company for a single 5-cent fare.

2. The company to expend approximately $26,000,000 in third-tracking and extending its existing lines and approximately $24,000,000 for the equipment of the new city lines to be operated by it.

3. The new city lines and also the third tracks and extensions of the existing lines to be subject to recapture at the end of ten years in accordance with the provisions of the rapid transit act. This recapture may be exercised either directly by the city or through a new contractor.

4. The receipts from the existing system and the new subway lines to be pooled, and from the gross receipts of both lines there is to be deducted and paid in the order named:

(a) Cost of operation, which shall include all operating expenses, all taxes, all rentals of leased property used in operation, if any, and provisions for depreciation and renewals.

(b) A sum of between $3,000,000 and $3,500,000, being the estimated income of the Brooklyn Union Elevated Railroad from the operation of its existing lines, to be retained by the company.

(c) The actual interest and sinking fund charges upon bonds issued by the company for construction and equipment.

(d) Interest and sinking fund upon bonds issued by the city.

(e) Any amount remaining to be divided equally between the city and the company, share and share alike.

The interest upon city bonds is cumulative, but if the revenue from operation in any year after providing for the cost of operation shall be insufficient to cover the deductions included in subdivisions (b) and (c) above, the deficit for such period is to be borne by the operator solely.

5. Future subway extensions required by the city may be added to the new city system, and will be equipped by the company, and if such extensions are accepted by the company, will be operated by the company under the general financial plan above outlined, and if not accepted by the company, will be operated under a separate accounting system based upon the per passenger method of apportionment.

Plan to Order Extensions in Seattle

The franchise committee of the City Council of Seattle, Wash., has decided to introduce into the Council a bill directing the Puget Sound Traction, Light & Power Company to extend ten or more of its existing lines. The company has declined to accept franchises for any extensions under the terms of the charter amendment which gives the city the right to take over any existing street railway at its pleasure, without any value being placed on the franchise grant. The suggestions for extensions were included in the message of Mayor George F. Cotterill to the Council.

The Mayor's message on the subject of street railway extensions was sent to the Council on June 17, 1912. The position of the company as stated by the Mayor was so misleading that the company submitted to the public in the form of a paid newspaper advertisement a statement of the facts. In this statement the company said:

"Anyone not familiar with the facts would, on reading the message, suppose that this company refuses to extend its lines, although traffic demands justify such extensions, unless the city grants franchises upon terms not authorized by the city charter.

"The company takes no such position.

"The Mayor and certain members of the Council refuse to grant any franchise for a street railway extension unless it contains provisions of the city charter which the Supreme Court of the State has held invalid, and while the company is ready to join with the city in again submitting the validity of those provisions to the Supreme Court, the Mayor and certain members of the Council who agree with him refuse to permit a test case to be made in order that a decision of the highest court of the State may be had."

The company concluded the advertisement as follows:

"The position of the company is frank, fair and reasonable. Ordinary business prudence requires the company to maintain it. The company will not be under any obligation to exchange transfers with such lines as the Mayor suggests should be constructed by the city, and it hopes that the public will not accept as well founded the legal opinions expressed in the message based upon a confusion of the facts and a misunderstanding of the law."

Plan to Unify Chicago Surface and Elevated Railways Abandoned

Two members of the new commission which is to value the elevated railways of Chicago, Ill., were named on July 1, 1912, by the city and the companies. William J. Wilgus, New York, N. Y., who recently valued the property of the Lehigh Valley Railroad and the Bethlehem Steel Company, was named by the companies, and James J. Reynolds, of the Chicago Harbor and Subway Commission, which made the former valuation of the elevated railways for the city, was named by Mayor Harrison. The third member of the commission will be selected by Mr. Wilgus and Mr. Reynolds.

At the meeting of the local transportation committee of the Chicago City Council on July 3, counsel for the elevated railways advised the committee that the appointment of Mr. Reynolds by the city as a member of the valuation commission would not be acceptable, in view of the fact that he had served as chairman of the original valuation commission. In spite of this, Mr. Reynolds' appointment was approved by the committee. Counsel for the railways then advised the committee that if Mr. Reynolds' name remained as the appointee, the companies would not submit to further valuation by any committee. The local transportation committee immediately moved to reconsider the resolution authorizing the appointment of a new valuation committee and carried out the final clause in the original resolution which instructed the Harbor and Subway Commission to draft a comprehensive plan of an independent subway system to be built by the city. This plan is to be presented to the transportation committee when it reconvenes early in September.

Changes and Improvements Proposed in Cleveland

An ordinance has been introduced in the City Council of Cleveland, Ohio, authorizing the Cleveland Railway to enter into a contract with the General Fire Extinguisher Company to equip a number of its yards with monitor nozzles and several of its carhouses with automatic sprinklers. The total amount to be expended for this purpose is about $32,741 and is to be charged to capital account.

Councilman Haserodt has introduced a resolution in the City Council authorizing the Cleveland Railway to secure consents of property owners for a double track on West 117th Street between Madison Avenue and Detroit Avenue at a cost of a 16-ft. pavement per foot frontage, providing the necessary frontage can be secured. The money to be expended for this work is to be paid from the $2,500,000 provided for additional equipment and power-house machinery. Another resolution introduced in the Council authorizes the company to enter into a contract with Andrew Dall & Son for the construction of a substation on Harvard Avenue at a cost of $21,750.

Resolutions are pending in the Council to authorize the company to decrease the number of stops on the Cedar Avenue, Central Avenue and Broadway lines. The state-

ment is made in the resolutions that the reduction in the number of stops on these lines was approved by a referendum vote of the patrons of the lines. This is an extension of the plan put into effect some months ago, on Superior Avenue, to shorten the schedule.

Street Railway Commissioner Witt is working on plans to turn all cars at the Public Square. He believes that the running time can be shortened in this way and congestion avoided at that point. Mr. Witt has planned a line from the Public Square on Ontario Street to the new court house and thence along Lakeside Avenue to the union station, the cars to return by the same route instead of reaching the square by way of West Ninth Street and Superior Avenue, as for many years past. The St. Clair Avenue line is to be extended to West Ninth Street, whence cars will run to Superior Avenue and to East Third Street and back to St. Clair Avenue. It is expected that these schedules will be ready about Sept. 20.

A report by Mr. Witt was submitted to the Council on July 1. It covers the period from March 1, 1912, to July 1, 1912. Mr. Witt refers to the still disputed point between the city and the company as to the extent to which the city may dictate the service to be furnished. He states that the company has declared that it will appeal in the courts if an effort is made to enforce orders which it believes would jeopardize the surplus fund. Mr. Witt advocates that the company should issue transfers between short-route cars and through cars, and at one additional point on the system. He suggests that if the residents of East Cleveland desire the faster service for which they have petitioned they should be made to pay a 5-cent cash fare, as do other suburban localities. He recommends that the plans of the company for establishing a night freight service should be approved and indorses the general use of the T-rail, which is now being used on some recent extensions.

Study of Street Railway History Proposed in Kansas City

Following a conference in private recently between Mayor Jost, of Kansas City, Mo., and A. F. Evans, city counselor, representing the city, and R. J. Dunham and Ford Harvey, receivers of the Metropolitan Street Railway, representing the company, the following statement was made public by Mayor Jost in regard to the purpose of the conferences which are now being held:

"The company claims it cannot conform to the present contract because it cannot raise the money on the short life of the franchise remaining to 1925. I wish to understand the present condition of the company, so as to enable the city to determine whether the company can do what is required under the present contract. Until I am satisfied that the company cannot meet its present contract with the city, I am unwilling to negotiate a new grant. It is proposed, with this in view, to begin a study of the street railway from its inception and the evolution of its different parts into the present system. This involves a study of the property of each part of the system, together with the obligations incurred on each which have culminated in the present condition of the whole property."

Light and Power Franchise Recommended in Richmond.—The committee on streets of the City Council of Richmond, Va., has recommended to the Council the passage of an ordinance granting to the Richmond & Henrico Railway a franchise to sell current for light and power purposes in Richmond.

Proposed Terminal Changes in Toronto.—The Ontario Railway Board has issued the formal order granting the application of the Toronto & York Radial Railway, Toronto, Ont., to deviate its tracks from Yonge Street to a private right-of-way between Farnham Avenue and its terminal station in the north end of the city. The company has been ordered to commence construction on or before July 10, 1912. The decision of the commission in this case was referred to in the ELECTRIC RAILWAY JOURNAL of June 29, 1912, page 1137.

Conference in Regard to Traffic Changes in Cincinnati.—Mayor Hunt and the officers of the Cincinnati (Ohio) Traction Company conferred on June 26, 1912, and following the conference it was announced that by the end of the summer more cars will be provided and the routes and schedules rearranged. W. Kesley Schoepf, president of the company, said that when the report of R. W. Harris, street railway expert, is made in August the company will be prepared to co-operate with the city in carrying out such suggestions as he may make. In the meantime an inventory of the rolling stock will be made.

Magnitude of Operations of the Pennsylvania Railroad.—The Pennsylvania Railroad System has made public figures which show that it has in the last twenty-five years paid $2,220,034,753 in wages, practically double the debt of the United States. The company has more than 73,500 stockholders. Its system has 11,503 miles of line and 25,236 miles of track, and the company employs about 185,000 persons. It operates in thirteen states, in which are located fully 75 per cent of the industries of the United States, where 90 per cent of the coal, iron and steel are produced, and where approximately 50 per cent of the total population of the country lives.

Storage Battery Car for Chicago, Terre Haute & Southeastern Railroad.—The Chicago, Terre Haute & Southeastern Railroad, one of the John R. Walsh properties, with M. J. Carpenter as president, has purchased a storage-battery car from the Federal Storage Battery Car Company for suburban service between Terre Haute and West Dana, 28 miles north. The car body dimensions are 48 ft. 7 in. over-all length, 9 ft. over-all width, with a seating capacity for forty-six passengers. There is an 8-ft. baggage compartment. The motor equipment includes four 25-hp motors of the Federal Storage Battery Car Company's design with its standard motor control equipment. The body is designed for double-end operation. The car is similar to one purchased by the Chicago Great Western Railroad.

Significance of Jersey Transfer Decision.—The present transfer conditions on the Public Service Railway, Newark, N. J., are not affected by the decision of the Court of Errors and Appeals to which attention was called in the ELECTRIC RAILWAY JOURNAL of June 29, 1912, page 1142. Prior to August, 1911, the Public Service Railway did not give transfers on "coincident lines," even where the same diverged. In that month the State Public Utilities Commission made an order directing the issuance of transfers at all intersecting points and refused to differentiate between "connecting" and "coincident" lines. The company complied at once with the board's order, but as some of the city officials attempted to read into the order an obligation on the part of the company to give transfers on transfers, the company carried the matter to the Supreme Court. The latter upheld the board's order without clearing away its ambiguity and an appeal was taken by the company to the Court of Errors and Appeals. The highest court has affirmed the judgment of the Supreme Court and has gone a step further and defined the meaning of the order of the utilities board as the court interpreted it. There has been no change from the method of giving transfers at all intersecting points as established in August, 1911.

Plan to Adjust Differences of Pennsylvania Railroad Employees.—A committee of the men in the employ of the Pennsylvania Railroad on its lines east of Pittsburgh and Erie, Pa., has accepted an arbitration proposal and a concession offered by the company on June 29 to bring about a satisfactory settlement of the grievances at issue. It is provided that in the event of the company extending the electrification of its lines the steam railroad men affected shall hold their positions or places paying them the same wages. In regard to the Hudson & Manhattan Railroad service between New York and New Jersey it is provided that the men employed in the steam railroad service who lost their positions because of the electrification shall be reinstated by July 1, 1913, and shall be paid the same rate of wages as they received before being replaced. The delay in the reinstatement of the men, it was stated, is due to the fact that the Pennsylvania Railroad has an agreement with the Hudson & Manhattan Railroad by which no changes can be made in wages without a year's notice. An arbitration board of four representatives of the company and four representives of the men is to define the rules affecting employees on the electrified lines. If this board fails to agree, Charles P. Neill, United States Commissioner of Labor, will be asked to act as the ninth member.

Financial and Corporate

Stock and Money Markets.

July 3, 1912.

The price movements of securities traded in on the New York Stock Exchange were confused to-day, but the general level of quotations was higher at the close than on the previous day. Following the decision of the Court of Appeals on Saturday in the preferential subway payment suits, both Brooklyn Rapid Transit and Interborough Rapid Transit issues were conspicuous in the trading. Brooklyn Rapid Transit stock advanced four points and a similar advance occurred in the bonds of the company. Rates in the money market to-day were: Call, 2½ @ 3 per cent; sixty days, 3¼ @ 3½ per cent; ninety days, 3½ @ 3¾ per cent.

Interest in the trading in Philadelphia was centered in the issues of the Philadelphia Rapid Transit Company, the voting trust certificates of which made a new high record for the year.

In the Chicago market business was very much restricted, and fluctuations, as a rule, were narrow.

In the Boston market there was pronounced strength in certain features. Massachusetts Electric issues were active.

In Baltimore trading was very quiet and the market was without feature.

Quotations of traction and manufacturing securities as compared with last week follow:

	June 26.	July 3.
American Brake Shoe & Foundry (common)	a95	a99
American Brake Shoe & Foundry (preferred)	a145	a96½
American Cities Company (common)	33⅝	33⅞
American Cities Company (preferred)	79⅝	79⅝
American Light & Traction Company (common)	a355	a355
American Light & Traction Company (preferred)	a110	a110
American Railways Company	a43¾	43¼
Aurora, Elgin & Chicago Railroad (common)	44	a45
Aurora, Elgin & Chicago Railroad (preferred)	a86½	a90
Boston Elevated Railway	a127	a127
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	78	a80
Boston & Worcester Electric Companies (common)	a9⅞	a9⅝
Boston & Worcester Electric Companies (preferred)	a55	a55
Brooklyn Rapid Transit Company	88⅛	93⅛
Capital Traction Company, Washington	126	a126
Chicago City Railway	a190	a190
Chicago Elevated Railways (common)	a35	a32
Chicago Elevated Railways (preferred)	a92½	a92
Chicago Railways, ptcptg., ctf. 1	a90	a90
Chicago Railways, ptcptg., ctf. 2	a25	a25
Chicago Railways, ptcptg., ctf. 3	a7	a8
Chicago Railways, ptcptg., ctf. 4	a4	a4
Cincinnati Street Railway	a130	a130
Cleveland Railway	a105	a105
Cleveland, Southwestern & Columbus Ry. (common)	*7	*7
Cleveland, Southwestern & Columbus Ry. (preferred)	*40	*40
Columbus Railway & Light Company	a55	a55
Columbus Railway (common)	80	80
Columbus Railway (preferred)	a95	a95
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a100	a100
Denver & Northwestern Railway	*135	*135
Detroit United Railway	a70	a70
General Electric Company	174½	179¾
Georgia Railway & Electric Company (common)	a125	a125
Georgia Railway & Electric Company (preferred)	a86	a85
Interborough Metropolitan Company (common)	20⅝	21½
Interborough Metropolitan Company (preferred)	59	60¾
International Traction Co., 4% bond, rcts	*75	*75
Indiana Union Traction Company	*7	*7
Kansas City Railway & Light Company (common)	a18½	a18½
Kansas City Railway & Light Company (preferred)	a46	a46
Lake Shore Electric Railway (common)	*7¼	*7¼
Lake Shore Electric Railway (1st preferred)	*91	*91
Lake Shore Electric Railway (2d preferred)	*25	*25
Manhattan Railway	134	135
Massachusetts Electric Companies (common)	19½	20⅝
Massachusetts Electric Companies (preferred)	a93	a93
Milwaukee Electric Railway & Light (preferred)	*105	105
Norfolk Railway & Light Co.	*29	*29
North American Company	82⅝	83⅛
Northern Ohio Light & Traction Company (common)	a65	a65
Northern Ohio Light & Traction Company (preferred)	a105	a105
Philadelphia Company, Pittsburgh (common)	a53	a52
Philadelphia Company, Pittsburgh (preferfed)	a43½	a43½
Philadelphia Rapid Transit Company	a23	a24½
Portland Railway, Light & Power Company	*69	*69
Public Service Corporation	a112	112
Third Avenue Railway, New York	38¾	39¾
Toledo Railways & Light Company	a6½	5
Twin City Rapid Transit Co., Minneapolis (common)	a109½	a108½
United Rys. & Electric Company (Baltimore)	24¼	a25¾
United Rys. Inv. Co. (common)	29½	30
United Rys. Inv. Co. (preferred)	58½	a58½
Virginia Railway & ower Company (common)	50½	50½
Virginia Railway & Power Company (preferred)	a87½	a87½
Washington Ry. & Electic Company (common)	a92	a92
Washington Ry. & Electric Company (preferred)	a94½	a95
West End Street Railway, Boston (common)	a85	a86
West End Street Railway, Boston (preferred)	a100½	a100½
Westinghouse Elec. & Mfg. Co.	74½	a77½
Westinghouse Elec. & Mfg. Co. (1st preferred)	a121¾	a121

*Last sale. a Asked.

Stockholders of Toledo Railways & Light Company Reject Reorganization Plan

The committee of stockholders of the Toledo Railways & Light Company, Toledo, Ohio, rejected the alternative plans for the reorganization of the company prepared at the instance of a sub-committee of the committees of the bondholders and the stockholders at a meeting held in Toledo on June 27, 1912. Attorney Barton Smith, acting for the committee of stockholders, stated the fact of the rejection as follows:

"The bondholders' committee submitted two plans of reorganization. Neither was entirely satisfactory to the majority of the stockholders and neither was accepted."

Both plans of financing provided for scaling down the present capitalization by about $13,730,000 and raising about $8,500,000 new cash capital. It is said that they also provided that the holders of the $4,866,000 of consolidated 4 per cent bonds should exchange them for 4 per cent second preferred stock and that the holders of stock in the old company should have an opportunity to subscribe for common stock in the reorganization. The stockholders who did not subscribe to the new stock were to receive a specified amount of the common stock.

It is stated that in case the bondholders decide to go ahead with the reorganization under foreclosure proceedings they will issue $5,000,000 of first mortgage 5 per cent bonds and $4,000,000 of 6 per cent first preferred stock to realize about $8,500,000 in cash. This will pay off the first mortgage and liquidate the floating debt. Holders of the 4 per cent bonds are understood to have agreed to accept $5,741,880 of 5 per cent second preferred stock for the principal and back interest, and the Toledo & Western syndicate $500,000 of the same. There will be $6,000,000 common stock. Present holders of the common will be allowed to subscribe for 6 per cent first preferred stock at par to the extent of 28 per cent of their holdings with 42 per cent in common stock as bonus.

The date for the reply of the company to the application for a receivership, made in the United States District Court by the United States Mortgage & Trust Company, has been extended from July 1 to Aug. 1.

Following the meeting of the stockholders' committee on June 20 the directors of the company convened in regular monthly session. President Coates stated that nothing but routine business was transacted.

A committee of the union employees of the company called upon Mr. Coates on June 26 to press their claims for a hearing on the demand for an increase in wages.

Beaumont (Tex.) Traction Company.—It is stated that arrangements have been made to pay off the $175,000 of outstanding receivers' certificates issued by J. F. Weed as receiver of the Beaumont Traction Company. These certificates, together with judgments aggregating $31,000 which have already been acquired by friends of the company, form the entire indebtedness to the company. It is likely that the receivership will be ended within thirty days.

Central Illinois Public Service Company, Mattoon, Ill.—Marshall E. Sampsell, Chicago, Ill., president of the Central Illinois Public Service Company and the Central Illinois Traction Company, is reported to have purchased $40,000 of the $50,000 of capital stock of the Paris Traction Company in the interest of the Central Illinois Public Service Company.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—Judge Carpenter in the United States District Court of Chicago, on June 27, 1912, granted the petition of W. O. Johnson, receiver of the Chicago & Milwaukee Electric Railroad, to pay the semi-annual interest due on July 1 on $1,080,000 of bonds. A similar petition will be made before Judge Geyer for the payment of interest on bonds of the Wisconsin division.

Columbus, Newark & Zanesville Electric Railway, Newark, Ohio.—The Public Service Commission of Ohio has issued an order authorizing the Columbus, Newark & Zanesville Electric Railway to issue $250,000 of 5 per cent. bonds, to provide funds to make improvements, etc., and to pay for work already done. The bonds must be sold at par.

Columbus, Urbana & Western Electric Railway, Columbus, Ohio.—L. P. Stevens, receiver of the Columbus, Urbana & Western Electric Railway, has prepared a request to the court for authority to issue receiver's certificates to provide funds to extend the road from Fishingers to Dublin and Marysville.

Dominion Power & Transmission Company, Hamilton, Ont.—It is stated that the MacKenzie and Mann interests have arranged to acquire control of the Dominion Power & Transmission Company on the basis of $125 a share for first preferred stock, $110 for the second preferred stock and $100 for the common stock. The authorized capital of the company is $25,000,000 and of this amount there are issued $3,673,000 of first preferred stock, $5,100,000 of second preferred stock and $2,608,000 of common stock. Five per cent bonds to the amount of $6,488,000 have been issued.

Electric Properties Company, New York, N. Y.—The Electric Properties Company has been taken over by a syndicate composed of the Westinghouse Electric & Manufacturing Company, the Equitable Trust Company, New York, N. Y., and William Morris Imbrie & Company, New York, N. Y., as a medium for dealing in the securities of public service corporations, as referred to in the department "Manufactures and Supplies" elsewhere in this issue.

Fort Dodge, Des Moines & Southern Railroad, Boone, Ia.—Judge Smith McPherson, of the District Court of the United States for the Southern District of Iowa, has authorized the receivers of the Fort Dodge, Des Moines & Southern Railroad to issue $800,000 of receivers' certificates. Of this amount $720,000 will be used to take up receivers' certificates issued in September, 1911. The remaining $80,000 will be used to pay for improvements.

Forty-Second Street, Manhattanville & St. Nicholas Avenue Railway, New York, N. Y.—The Public Service Commission of the First District of New York has granted the application of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway for approval of a supplemental mortgage to secure an issue of $1,200,000 of bonds redeemable at 110, to bear interest at the rate of 5 per cent.

General Gas & Electric Company, New York, N. Y.—W. S. Barstow & Company, Inc., New York, N. Y., who are engaged in managing and financing public utility companies, have organized the General Gas & Electric Company under the laws of Maine. W. S. Barstow is president of the new company. The names of the other officers and the directors will be announced shortly. The authorized capital of the company consists of $10,000,000 of common stock and $10,000,000 of 6-7 per cent cumulative preferred stock. There will also be $20,000,000 of first mortgage 5 per cent sinking fund convertible gold bonds due in 1932. There are to be issued at this time $2,600,000 of common stock, $1,300,000 of preferred stock and $1,400,000 of bonds. The companies which will be taken over and managed by Barstow & Company are the Western Vermont Light & Power Company and the Northwestern Ohio Railway & Power Company. The first-named company will own and operate the hydroelectric plant at Carver's Falls, Vt., and will also operate the property of the Rutland Railway, Light & Power Company under lease. The Northwestern Ohio Railway & Power Company will take over the Toledo, Port Clinton & Lakeside Railway, which was recently acquired by Barstow & Company. According to estimates by Barstow & Company the net earnings of the constituent properties during the coming year will be about $235,000.

Illuminating & Power Securities Corporation, New York, N. Y.—The Illuminating & Power Securities Corporation was incorporated recently under Virginia laws to deal in securities and in properties of public-service corporations. Its president is C. P. Hamilton, and S. W. Childs and R. C. Morse are its vice-presidents. Mr. Hamilton, Mr. Childs, Mr. Morse and M. P. Clough, W. S. Clough, F. W. Stehr and E. B. Tracy are the directors of the company. The new company has $3,000,000 of preferred stock, cumulative at 7 per cent after Aug. 1, 1912, and $5,000,000 of common stock. Of the former $1,250,000 is to be issued. All of the $5,000,000 common stock is outstanding. Among the securities which will be turned over to the new corporation are the following: American Utilities Company, 1000 shares common; Federal Utilities, Inc., 300 shares common; General Electric Company, 250 shares; General Utilities Corporation, 200 shares preferred; Pacific Gas & Electric Company, 1000 shares common; Republic Railway & Light Company, 1000 shares common; Tennessee Railway, Light & Power Company, 500 shares common; United Railways Company of St. Louis, 500 shares preferred; Washington, Baltimore & Annapolis Electric Railroad, 600 shares preferred and 1801 shares common.

Indiana Union Traction Company, Anderson, Ind.—A supplementary complaint has been filed to the suit brought some time ago in the Marion Circuit Court to prevent the merger of the Indiana Union Traction Company and the Union Traction Company of Indiana, approved by the stockholders of these companies on April 25, 1912. The court is now asked to set aside all acts taken by the directors and officers of the two companies toward the consolidation.

International Traction Company, Buffalo, N. Y.—It was announced that the semi-annual interest which matured on July 1, 1911, on the fifty-year collateral trust 4 per cent bonds of the International Traction Company would be paid at the office of J. P. Morgan & Company, New York, N. Y., on or after July 1, 1912, with 5 per cent interest thereon from July 1, 1911, to July 1, 1912. The committee of holders of the fifty-year collateral trust 4 per cent bonds has announced that more than 99 per cent of bonds have been deposited under the modified plan of reorganization dated Jan. 20, 1911, and that the necessary arrangements have been made to advance to the holders of certificates of deposit the interest due on July 1, 1912, on the bonds.

Johnson City (Tenn.) Traction Company.—The property of the Johnson City Traction Company has been sold to the Tennessee Eastern Electric Company, which has been formed by Eastern capitalists, chief among whom are Warner, Tucker & Company, Boston, Mass. Arrangements are being made to build a water-power plant on the Nolachucky River, near Greeneville, Tenn., which will supply current to operate the Johnson City system. The company plans also to construct a number of interurban railway lines, probably to Greeneville, Morristown, Erwin and Jonesboro. The new owners have also acquired the property of the Watauga Power Company, Johnson City, which has been owned and operated by the same interests as control the railway. The work of designing the power plant is in the hands of W. V. N. Powelson, New York, N. Y., who has established quarters at Johnson City and will be in charge of the work. The cost of the proposed new plant will be $500,000.

Mason City & Clear Lake Railroad, Mason City, Ia.—E. H. Rollins & Sons, Boston, Mass., and New York, N. Y., are offering at 101 and interest $290,000 of first and refunding mortgage 6 per cent gold bonds of the Mason City & Clear Lake Railroad, dated June 1, 1912, and due June 1, 1932, but redeemable on any previous interest date at 105 and interest. The First Trust & Savings Bank, Chicago, Ill., is trustee under the mortgage securing the bonds.

Montgomery Light & Traction Company, Montgomery, Ala.—The Montgomery Light & Traction Company, which succeeded the Montgomery Traction Company, has filed for record a certificate of an increase in its authorized capital stock from $1,000,000 to $2,000,000, as voted by the stockholders on March 28. All of the $2,000,000 of capital stock is outstanding. The company has an authorized issue of $5,000,000 of bonds and $1,000,000 of this amount is outstanding. The name of the company was changed from the Montgomery Traction Company so as to indicate more clearly the nature of the business which it conducts. The officers of the company are Ray Rushton, president; Richard Tillis, vice-president; H. F. Grenshaw, secretary; Charles E. Morton, treasurer.

New Hampshire Electric Railways, Haverhill, Mass.—Legislation has been obtained to permit the consolidation of seven Massachusetts and three New Hampshire subsidiary companies of the New Hampshire Electric Railways, and it is expected to effect the merger within the next sixty days. The Massachusetts Northeastern Street Railway Company will be the title of the ten merged or consolidated companies. The companies which are to be merged

are the Seabrook & Hampton Beach Street Railway, Haverhill, Plaistow & Newton Street Railway and Hudson, Pelham & Salem Street Railway, New Hampshire companies, operating 44.68 miles of line, and the Lowell & Pelham Street Railway, Lawrence & Methuen Street Railway, Haverhill & Amesbury Street Railway, Haverhill & Plaistow Street Railway, Haverhill & Southern New Hampshire Street Railway, Amesbury & Hampton Street Railway and Citizens' Electric Street Railway, Massachusetts companies, operating 82.27 miles of line. With the exception of the Haverhill & Amesbury Street Railway and the Citizens' Electric Street Railway, all of the companies are interdependent and cannot be operated independently. They were built as one system and have been so operated since their construction some nine or ten years ago. All of the companies to be consolidated are supplied with power by the Rockingham County Light & Power Company, Portsmouth, N. H., a subsidiary of the New Hampshire Electric Railways, and all of the stock and most of the bonds of the companies are owned by New Hampshire Electric Railways. The merger is in the interest of economy in management.

New Midland Power & Traction Company, Cambridge, Ohio.—The New Midland Power & Traction Company has succeeded the Midland Power & Traction Company and a number of changes have been made in the officers of the company. E. T. Hall has been elected president, to succeed John J. Hall. W. A. Gibbs, formerly general manager, is vice-president and general manager, and William Pagen is superintendent.

Northwestern Ohio Railway & Power Company, Toledo, Ohio.—The Northwestern Ohio Railway & Power Company has applied to the Public Service Commission of Ohio for authority to issue $1,100,000 of bonds, $500,000 of preferred stock and $800,000 of common stock to take over the property of the Toledo, Port Clinton & Lakeside Railway. The commission will hear the petition on July 12, 1912.

Pawcatuck Valley Street Railway, Westerly, R. I.—Robert W. Perkins, Norwich, Conn., has been appointed assignee of the Pawcatuck Valley Street Railway, which confessed involuntary bankruptcy recently.

Philadelphia Company, Pittsburgh, Pa.—A quarterly dividend of 1¾ per cent has been declared on the $38,952,000 of common stock of the Philadelphia Company, payable on Aug. 1, 1912, to stockholders of record on July 1. This dividend compares with 1½ per cent paid quarterly from May, 1902, to May, 1912, both inclusive, with extra payments of one-half of 1 per cent in August and November, 1911 and 1910.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—The stockholders of the Puget Sound Traction, Light & Power Company have voted to authorize the reincorporation of the company under the laws of Massachusetts. The company is under the management of Stone & Webster, Boston, Mass., and the reincorporation will make the stock non-taxable in that State, where much of it is already held.

Public Utilities Company, Evansville, Ind.—The Public Utilities Company, the incorporation of which was noted in the Electric Railway Journal of June 22, 1912, page 1092, has elected the following directors: Charles M. Murdock and Henry W. Marshall, Lafayette, Ind.; B. C. Cobb and W. H. Barthold, New York; Frank Silliman, Philadelphia, and William H. McCurdy, Charles Finley Smith, F. W. Cook and Wallace Cook, Evansville.

Third Avenue Railway, New York, N. Y.—The Public Service Commission of the First District of New York has approved the application of the Third Avenue Railway to acquire various blocks of stocks in subsidiary companies, including 693 shares of stock of the Dry Dock, East Broadway & Battery Railroad; 8,002 shares of the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway; 6,000 shares of the New York, Westchester & Connecticut Traction Company, and 28,650 shares of the New York City Interborough Railway. The last company was formerly controlled by interests connected with the Interborough Rapid Transit Company. The commission in taking this action relative to the New York City Interborough Railway followed the principle laid down by the Hadley commission in its report to President Taft in November, 1911, to the effect that minority stockholders should be permitted to sell their stock at an average price which would equal that of the majority stockholders.

United Light & Railways Company, Grand Rapids, Mich.—N. W. Halsey & Company, New York, N. Y., are offering for subscription at 92½, to yield 5⅝ per cent, the unsold balance of $4,300,000 of first and refunding mortgage 5 per cent gold bonds of the United Light & Railways Company. The bonds are dated June 1, 1912, and are due June 1, 1932. The New York Trust Company and Mortimer N. Buckner are trustees under the mortgage given to secure the bonds.

Yonkers (N. Y.) Railroad.—Application has been made to the Supreme Court of Westchester County to dissolve the receivership of the Yonkers Railroad.

Dividends Declared

Augusta-Aiken Railway & Electric Company, Augusta, Ga., quarterly, 1½ per cent, preferred.

Bay State Street Railway, Boston, Mass., 3 per cent, first preferred; 2 per cent, common.

Boston (Mass.) Suburban Electric Companies, quarterly, $1, preferred.

Denver & Northwestern Railway, Denver, Col., quarterly, 2 per cent.

New England Investment & Security Company, Springfield, Mass., 2 per cent, preferred.

Ohio Traction Company, Cincinnati, Ohio, quarterly, 1 per cent, common.

Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil, quarterly, 1¼ per cent.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent, first preferred and preferred.

Springfield & Xenia Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

Wheeling (W. Va.) Traction Company, quarterly, 1¼ per cent.

Youngstown & Ohio River Railroad, Youngstown, Ohio, quarterly, 1⅛ per cent, preferred.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred; ⅞ of 1 per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

CAPE BRETON ELECTRIC COMPANY, LTD.

Period.			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus
1m.,	Apr.,	'12	$26,559	*$16,064	$10,495	$5,703	$4,792
1 "	"	'11	23,332	*12,810	10,521	7,150	4,887
12 "	"	'12	343,489	*189,470	154,018	67,823	86,195
12 "	"	'11	327,303	*175,735	151,569	67,850	83,719

DALLAS ELECTRIC CORPORATION.

1m.,	Apr.,	'12	$141,098	*$92,418	$48,681	$24,672	$24,009
1 "	"	'11	125,387	*89,160	36,227	11,755	14,472
12 "	"	'12	1,671,308	*1,114,172	557,136	253,286	303,850
12 "	"	'11	1,527,202	*1,034,204	492,998	247,482	245,517

GALVESTON-HOUSTON ELECTRIC COMPANY.

1m.	Apr.,	'12	$151,603	*$94,102	$57,502	$33,816	$23,686
1 "	"	'11	121,147	*74,904	46,242	19,345	26,897
12 "	"	'12	1,658,113	*1,032,171	625,942	288,566	337,376
12 "	"	'11	1,365,290	*866,179	499,110	237,832	261,278

HOUGHTON COUNTY TRACTION COMPANY.

1m.,	Apr.,	'12	$24,567	*$13,416	$11,151	$5,112	$6,039
1 "	"	'11	25,509	*14,074	11,435	5,227	6,208
12 "	"	'12	300,688	*177,996	122,692	62,605	60,087
12 "	"	'11	306,123	*181,468	124,656	63,030	61,626

JACKSONVILLE TRACTION COMPANY.

1m.,	Apr.,	'12	$51,284	*$32,382	$18,902	$9,643	$9,259
1 "	"	'11	46,164	*30,061	16,103	6,925	9,178
12 "	"	'12	568,075	*353,074	215,001	109,025	105,976
12 "	"	'11	583,544	*359,147	224,397	79,639	144,757

PADUCAH TRACTION & LIGHT COMPANY.

1m.,	Apr.,	'12	$23,625	*$16,264	$7,361	$7,131	$230
1 "	"	'11	21,452	*13,567	7,886	6,551	1,334
12 "	"	'12	275,716	*177,896	97,819	83,288	14,531
12 "	"	'11	253,931	*154,514	99,417	74,770	24,647

PUGET SOUND TRACTION, LIGHT & POWER COMPANY.

1m.,	Apr.,	'12	$669,409	*$393,186	$276,223	$164,898	$111,325
4 "	"	'12	2,742,918	*1,591,807	1,151,111	639,705	511,406

TWIN CITY RAPID TRANSIT COMPANY.

1m.,	May,	'12	$690,630	$331,905	$358,725	$143,079	$215,646
1 "	"	'11	658,739	311,974	346,765	140,079	206,685
5 "	"	'12	3,233,703	1,712,753	1,520,950	712,396	808,554
5 "	"	'11	3,100,450	1,602,445	1,498,005	700,396	797,609

*Includes taxes.

Traffic and Transportation

Changes in Schedule in Philadelphia

The Philadelphia (Pa.) Rapid Transit Company has announced that all of the car schedules at the Frankford carhouse will be revised and made effective as of Sunday morning, July 7, 1912. The present car schedules at this depot provide 116 so-called straight runs in which the men complete their entire day's work without relief. The revised schedules provide for only eighty-seven runs of this kind. The present schedules provide sixty so-called swing runs The maximum period during which a day's work is performed is over fourteen hours, and there are twenty such runs which require an over-all time of from thirteen to over fourteen hours to complete a day's work of from nine to ten hours. Under the revised car schedules the maximum period during which a day's work is performed is only fourteen hours. There are, however, seventy-two such runs, which have a relief period during the middle of the day so as to enable the cars to be operated during both the morning and evening rush hour periods, these requiring an over-all time of from thirteen to fourteen hours to complete a day's work of from nine to ten hours.

Under the present car schedules a total of 176 runs are operated. This number is reduced by the new schedules to 173. The three crews by this change temporarily reduced to the extra list will be guaranteed the minimum wage of $2 per day, as set forth in Bulletin No. 5. By these revised schedules the number of crews required to operate swing runs is increased from sixty to eighty-six. The endeavor of the timetable department has been to arrange a day's work so that it shall be of not more than ten hours' duration, all to be completed within a maximum period of fourteen hours.

These changes in schedules will make possible the operation of 116 cars during the morning rush hour period, as against 104 cars at present, and 124 cars in the evening rush-hour period, as against 105 cars at present. The number of cars operated during the midday hours of light traffic will be reduced from eighty-seven to seventy-six.

In a statement which it issued in regard to the schedule changes the company said:

"In the early days of street railroading cars were operated eighteen hours out of the twenty-four. The men on the swing cars were then required to put in six hours during the morning, were then off six hours and worked the remaining six hours up to midnight. The name of swing runs thus became one most distasteful to the men in that it required very unreasonable hours of service.

"The modern car schedules call for a car service more closely adjusted to the needs of traffic. As the present work day under this management is within approximately ten hours, all to be performed within an over-all period of fourteen hours, the difference between the old methods and those which now prevail is evident, and the fear of the so-called swing runs by some of the men is largely due to their recollection of old methods, fostered by the misleading statements of professional trouble makers."

Chicago Public Conveyance Anti-Advertising Ordinance

The Chicago City Council on July 1, 1912, passed the following ordinance prohibiting all persons or corporations from using space in any street car, elevated railroad passenger car, steam passenger car, or other vehicle for advertising purposes, except to display announcements incidental to the management of the company's business:

"Section 1. That no person or corporation shall use any passenger coach, street car, omnibus coach, car, elevated railroad passenger car, steam passenger car, underground car or other vehicle used for the transportation of passengers or property for hire, operated in, on, along, across, over or under streets, alleys or public grounds of the city of Chicago, or the Chicago River within the limits of the city of Chicago, for the purpose of carrying on an advertising business inside or on the outside of any passenger coach, street car, omnibus coach, car, elevated railroad car, steam car, underground car or other vehicles used for the transportation of passengers or property for hire. Nothing herein contained, however, shall prevent the display of the necessary advertising of business which is purely incidental to the carrying of passengers or mail for hire, so long as such carrying of passengers and mail is the usual business of a person or corporation engaged in such transportation of passengers and mail for hire.

"Section 2. Every person or corporation who is convicted of a violation of this ordinance shall be fined not less than $10 nor more than $100 for each offense, and each day's violation of this ordinance shall be deemed a separate offense.

"Section 3. This ordinance shall be in full force and effect from and after its passage, approval and due publication."

It is understood that the railways will test the ordinance in the courts.

Petition for Interchange of Freight.—A petition has been filed with the Indiana Railroad Commission for an order to require the Grand Trunk Railway to interchange with the Chicago, South Bend & Northern Indiana Traction Company freight intended for Dixon and Locker.

Stops in Nashville.—The Nashville Railway & Light Company, Nashville, Tenn., has announced that at certain intersections in the congested district cars will stop on both sides of the street. The object is to reduce the danger to pedestrians as much as possible. An ordinance was introduced in the Council recently to prevent automobiles from passing street cars from which passengers are alighting.

Decision in Sunday Operation Case in Canada.—Chancellor Boyd at Toronto has decided to fine the London & Lake Erie Railway & Transportation Company $1,200 and costs for operating cars on Sunday. The company operates from London to St. Thomas, Ingersoll, Paris and other points. The chancellor held that the company comes under the Ontario railway act and does not come under any of the exceptions in either the Ontario railway act or the railway act of Canada. The decision will probably be appealed.

Praise for Philadelphia Near-Side Cars.—T. E. Mitten, chairman of the executive committee of the Philadelphia (Pa.) Rapid Transit Company, received recently a letter in part as follows from the secretary of the North Frankford Avenue Business Men's Association: "At our meeting last evening, the first since the new cars have been in operation on this avenue, the members were loud in their praise of the new cars. They were so well pleased that they directed me to voice to you their appreciation of your efforts in changing car accommodations so promptly. Your green cars are all that is claimed for them, and we can only wish luck to the sections of the city which have not yet been favored with service with the new cars."

Service in Sarnia Interrupted by Fire.—The plant of the Sarnia Gas & Electric Company, Sarnia, Ont., was destroyed by fire on June 27, 1912. The loss is estimated at $100,000. The fire has resulted in the temporary cessation of service by the Sarnia Street Railway, which purchased power from the Sarnia Gas & Electric Company. The Sarnia Street Railway has arranged with the Grand Trunk Railway to operate train service between the railroad terminal station and the foot of Cromwell Street. The service of the Sarnia Street Railway to the beach has been abandoned and the service to Point Edward and South Sarnia is being handled with horses. The company has taken emergency measures to replace the equipment which was destroyed.

Joint Rate on Lumber Asked in New York State.—The Public Service Commission of the Second District of New York has received a complaint from the A. Weston Lumber Company, Olean, N. Y., asking the commission to direct the New York Central & Hudson River Railroad, the Buffalo, Rochester & Pittsburgh Railway and the Western New York & Pennsylvania Traction Company to join in a rate so that lumber may be shipped from North Tonawanda to Olean. The complaint states that large quantities of lumber are required by the complaining company and the only railroad route is over the lines of the companies mentioned in the complaint. The commission has asked the companies to answer the complaint within twenty days.

Outing of the Cincinnati Traction Company Employees at Coney Island.—The Street Railway Employees' Mutual Protection Association, composed of employees of the Schoepf lines in and about Cincinnati, held a three-day outing at Coney Island, which ended on June 22. On the evening of June 20 the employees tendered a banquet to the officials of the company. Thomas J. Sullivan, president of the association, presided. Director of Public Safety Cash and Judge Lueders were the principal speakers. Both of these gentlemen congratulated the men on the spirit of the association. R. E. Lee, general superintendent of the company, on behalf of President Schoepf, presented the Brighton bowling team of the Traction League with the silver trophy donated by Mr. Schoepf.

New Fare Schedule on Buffalo Suburban Line.—Effective on June 24, 1912, the International Railway, Buffalo, N. Y., put into effect by order of the Public Service Commission of the Second District of New York a new joint one-way fare over the Crosstown Street Railway and the Buffalo & Lake Erie Traction Company, in both directions between the junction of Seneca Street and Bailey Avenue, Buffalo, and Hamburg Turnpike points in Lackawanna, known as Gates No. 1 and No. 2 of the plant of the Lackawanna Steel Company, via route as specified in tariff, 6 cents, including privilege of free transfer from and to points on the Seneca or Cazenovia lines east at the following transfer junctions: Seneca line, at Seneca Street and Bailey avenue; Cazenovia line, at Abbott Road and Bailey Avenue.

Increase in Wages in Brooklyn.—T. S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, made public the following announcement on June 28, 1912: "Our directors, in recognition of faithful work, have authorized an increase in the wages of nearly all the men in the transportation department of the surface roads of the Brooklyn Rapid Transit System. The increase affects about 5000 men, including assistant superintendents, depot masters, dispatchers, starters, inspectors, conductors and motormen, and will be effective on and after July 1, 1912. The new rates for conductors and motormen vary according to length and efficiency of service, ranging from 23 cents an hour for beginners to 26 cents after four years. The average increase is about 5 per cent. The other increases are on a corresponding basis."

Decision of Arbitration Board at Ottawa.—The board of arbitration which has been considering the question of the wages of employees of the Ottawa (Ont.) Electric Railway has decided that first and second-year men shall be granted an increase of 1½ cents an hour and men who have been with the company three years or more shall be granted an increase of 2 cents an hour. According to the finding of the board of arbitration shopmen, shedmen and linemen will get an increase of 1½ cents an hour. The maximum wage for trainmen now is 25 cents per hour for week days and 27 cents for Sunday. The demand was for a maximum of 30 cents for week days and 32 cents for Sundays. The board has refused the requests for a nine-hour day and recognition of the union. The report received the approval of P. M. Draper, who represented the men.

Riding on Running Board Prohibited.—The Public Utilities Commission of Connecticut has adopted an order instructing the street railways under its jurisdiction to prohibit passengers from riding on the running board of open cars. The commission says in part: "The commission feels that riding on the running board of electric railway cars is a dangerous practice and that any order passed by this commission tending to prevent the riding on running boards of open cars should apply to single as well as double running-board cars. Any remedy adopted at this time with the present type of car may, in certain instances, work to the inconvenience of the traveling public, but we deem it equitable in the premises and in the interest of safety to pass, and do hereby pass, the following order: The Connecticut Company and all other electric street railways operating side entrance open cars in the State are ordered and directed to adopt and issue as one of their operating rules an order forbidding passengers from riding on the steps or running boards of all their side-entrance open cars." Some time ago the Connecticut Company was ordered by the Public Utilities Commission to equip its open-bench summer cars with double running board and this work is now well under way.

Personal Mention

Mr. Henry L. Drayton, municipal corporation counsel of Toronto, Ont., has been appointed chief of the Board of Railway Commissioners for Canada to succeed J. P. Mabee, deceased.

Mr. J. H. Kennedy has resigned as master mechanic of the St. Albans & Swanton Traction Company, St. Albans, Vt., to become connected with the Vermont Power & Manufacturing Company, St. Albans, Vt.

Mr. E. T. Hall has been elected president of the New Midland Power & Traction Company, Cambridge, Ohio, the successor to the Midland Power & Traction Company. Mr. E. T. Hall succeeds Mr. John J. Hall as president of the company.

Mr. W. A. Gibbs, formerly general manager of the Midland Power & Traction Company, Cambridge, Ohio, has been elected vice-president and general manager of the New Midland Power & Traction Company, which has succeeded the Midland Power & Traction Company.

Mr. U. L. Upson has been appointed general manager of the Ottawa, Rideau Lakes & Kingston Railway, with headquarters at Ottawa, Ont., which is building an electric railway to connect Ottawa and Kingston. Mr. Upson was formerly manager of the Buffalo, Hamburg & Aurora Railroad, Buffalo, N. Y.

Mr. W. J. Barker, second vice-president of the Denver Gas & Electric Company, president of the Summit County Power Company and president of the North Colorado Power Company, Denver, Col., has been elected president of the Boulder Electric Light & Power Company, Boulder, Col., to succeed Mr. E. J. Temple.

Mr. R. M. Coffey, of the claim department of the Seaboard Air Line Railway, Portsmouth, Va., has been appointed general claim agent of the Piedmont & Northern Railway with headquarters at Charlotte, N. C. Mr. Coffey entered the employ of the Seaboard Air Line Railway at Orlando, Fla., twenty-two years ago as a clerk. He later entered the passenger traffic department, and twelve years ago he was appointed traveling passenger agent for the company with headquarters in Charlotte. Since that time he has represented the company in a number of states, entering the claim department several years ago.

OBITUARY

Louis Ellsworth Carlton, president of Heywood Brothers & Wakefield Company, died at his home in Gardner, Mass., on July 4, 1912, after a long illness. Mr. Carlton was fifty years old.

Clarence H. Bissell, vice-president of the Murphy Varnish Company, Newark, N. J., died on June 30, 1912, at Cooperstown, N. Y. Mr. Bissell was born on April 6, 1873, at Milford, N. Y., and was graduated from Princeton in 1895. He was president of the Imperial Car Cleaner Company and vice-president of the Blanchite Paint Company.

Richard T. Laffin, vice-president of the Puget Sound Traction, Light & Power Company, Seattle, Wash., died at Seattle on June 26, following an operation for intestinal trouble. Mr. Laffin was very well known in electric railway and engineering circles in the East. For many years he was connected with the Boston (Mass.) Elevated Railway and later was general manager of the Worcester (Mass.) Consolidated Street Railway. He resigned from the latter company to become vice-president and general manager of the Manila Electric Railroad & Light Company, Manila, P. I., and spent four years in the Philippines, during which time he was in charge of the reconstruction and electrification of the street railway lines in that city by J. G. White & Company, Inc., New York, N. Y. Mr. Laffin returned to the United States in 1909 and became associated with the Stone & Webster Management Association, Boston, Mass., in connection with the Seattle Electric Company and other Puget Sound railway and lighting properties. Early in 1912 he was elected vice-president of the newly organized Puget Sound Traction, Light & Power Company, Seattle, Wash., which was incorporated in the interests of Stone & Webster, to effect a merger of the properties which they manage in the Puget Sound district.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Americus, Tifton & Atlantic Railway, Tifton, Ga.**—Incorporated in Georgia to build an electric or steam railway from Americus, Ga., to the Florida line near Jacksonville, via Sumter, Lee, Crisp, Worth, Turner, Irwin, Tift, Berrien, Clinch and Charlton Counties. Capital stock, $100,000. Headquarters: Tifton. Incorporators: G. R. Ellis and W. M. Crook, Americus; D. J. Dupree, Oakfield; C. J. Champion, Doles; J. S. Shingler and J. L. Evans, Ashburn; H. H. Tift and J. W. Myers, Tifton; J. D. Lovett, Nashville, and T. V. Talley, Milltown.

***Chicago, Springfield & Cairo Railroad, Chicago, Ill.**—Chartered in Illinois to build an electric or steam railway between Chicago, Springfield and Cairo. Capital stock, $10,000. Headquarters, Chicago. Incorporators and first board of directors are Delos P. Phelps, M. C. Myers, Jasper T. Darling, Charles G. Fox and W. C. Gregory, all of Chicago.

***Huntington, Richmond & Hamilton Railway, Huntington, Ind.**—Application for a charter has been made by this company in Indiana to build an electric railway from Huntington, through Bluffton and Portland to Richmond. Capital stock, $100,000. Smith H. Macy, chairman of the board of directors.

Frankfort & Shelbyville Realty Company, Shelbyville, Ky.—Incorporated in Kentucky to secure right-of-way for a line between Shelbyville and Frankfort, with the idea of turning over the property to a company which will agree to build the railway. Capital stock, $500. Incorporators: R. D. Armstrong, E. H. Taylor, Jr., Eli H. Brown, Frankfort, and W. B. Middleton and W. M. Nash, Shelbyville, Ky. [E. R. J., June 15, '12.]

***Iron County Central Railroad, Bixby, Mo.**—Incorporated in Missouri to build a 6-mile interurban railway between Bixby and the timber lands. Capital stock, $60,000. Incorporators: David A. Bixby, H. W. Wolff, L. T. Carroll, Milo C. Shands and A. P. Brigham, all of St. Louis.

Mount Bethel (Pa.) Street Railway.—Incorporated in Pennsylvania to build an electric railway to connect the lines of the Bangor & Portland Traction Company and the lines of the Stroudsburg, Delaware Water Gap & Portland Street Railway. Capital stock, $12,000. Frank B. Beck, Mount Bethel, is interested. [E. R. J., April 13, '12.]

***White Sulphur & Huntersville Railroad, White Sulphur, W. Va.**—Incorporated in West Virginia to build an electric or steam railway from White Sulphur to Huntersville, a distance of 40 miles. Capital stock, $30,000. Incorporators: Frank A. Hauck, Ronceverte, W. Va.; Frank Hoen, Joseph T. England, William R. Hudgins and Warren B. Bunting, of Baltimore.

FRANCHISES

Los Angeles, Cal.—The Pacific Electric Railway, Los Angeles, has received a franchise from the Council on San Pedro Street and Los Angeles Street in Los Angeles.

Stockton, Cal.—The Central California Traction Company, San Francisco, has asked the City Council for a forty-six-year franchise to extend its lines in Stockton.

Atlanta, Ga.—Hollins N. Randolph has asked the Council for a franchise for an electric railway through Atlanta for the Atlantic & Macon Railway. [E. R. J., June 29, '12.]

Centerville, Ia.—The Southern Iowa Traction Company has asked the Council for a franchise for an extension around the public square in Centerville.

Bangor, Maine.—The Bangor Railway & Electric Company has received a franchise from the Council to extend its lines in Bangor 7.7 miles.

Albert Lea, Minn.—The Sioux Falls & Southern Minnesota Traction Company, Pierre, S. D., has asked the Council for a franchise in Albert Lea. This 110-mile line will connect Sioux Falls, S. D., and Albert Lea, Minn., via Worthington, Luverne, Loon Lake, Dresden and Petersburg. A branch will be constructed through Wells, Waseca and Faribault. H. W. Knight is interested. [E. R. J., May 11, '12.]

Baltimore, Md.—The Washington, Westminster & Gettysburg Railway has asked the Public Service Commission for permission to build its line from Washington to Sandy Springs and Gettysburg. Williams H. Saunders, president.

***Clayton, Mo.**—Paul Brown and associates have received a franchise from the County Court to build a 2-mile electric railway from a point 300 ft. south of Clayton Road, at the city limits of St. Louis, to the right-of-way of the St. Louis & Suburban Railway.

Springfield, Mo.—The Springfield Traction Company has asked the Aldermen for a franchise for an extension of its St. James Avenue line in Springfield.

New York, N. Y.—The Manhattan & Jamaica Railway, Patchogue, has asked the Public Service Commission, First District, for a certificate of public convenience and necessity for the railway formerly known as the South Shore Traction Company to build a double track from Third Avenue and Forty-ninth Street to the line between the counties of Queens and Nassau.

Troy, N. Y.—The United Traction Company, Albany, has asked for a franchise to extend its Mill Street line in South Troy.

Fargo, N. D.—The Fargo & Moorhead Street Railway has received a twenty-five-year franchise in Fargo.

Hamilton, Ont.—The Hamilton, Waterloo & Guelph Railway has been granted by the City Council of Hamilton, Ont., an extension of three months from July 1 in which to start construction on its proposed line to Guelph.

***Hammond, Ore.**—George A. Robinson, vice-president of the Chehalis & Coroltz Railroad, has received a franchise from the City Council to build an electric railway in Hammond.

Ellwood City, Pa.—The Beaver Falls, Koppel & New Castle Railway, New Castle, has asked the Council for a franchise in Ellwood City. This line will connect New Castle, Hillsville, Poland and Youngstown. [E. R. J., Feb. 24, '12.]

McKeesport, Pa.—The Pittsburgh, McKeesport & Westmoreland Railway has accepted an ordinance giving it right-of-way over Lincoln Way from Robinson Street to the tracks of the Pittsburgh Railways in Fifth Avenue.

Reading, Pa.—Mayor Stratton, Reading, has vetoed the ordinance permitting the Reading City Passenger Railway to construct a loop at the foot of Penn Street to handle Pennsylvania Railroad traffic, on account of the franchise conferred by the ordinance being unlimited.

Marietta, W. Va.—The Parkersburg, Marietta & Interurban Railway, Parkersburg, has received a twenty-five-year franchise from the Council to extend its lines over several streets in Marietta.

TRACK AND ROADWAY

***Little Rock, Ark.**—Local business and professional men headed by A. C. Read advocate the construction of an electric railway from the Highland Park line to the Landreth and Cox addition west of Little Rock. The construction of an electric railway in the East End and another in the West End is also advocated. It is stated that the rights to build these lines will be secured and then tendered to the Little Rock Railway & Electric Company.

Northern Electric Railway, San Francisco, Cal.—This company is building its Colusa branch westerly from Yuba City. The roadbed has been graded to Meridian.

San Diego, Riverside & Los Angeles Railway, San Diego, Cal.—This company has ordered 20,000 ties, 1,000 tons of steel rails and other material for the construction of its line between San Diego and Los Angeles. Maurice Salzeman, Los Angeles, Cal, president. [E. R. J., June 22, '12.]

Connecticut Company, Waterbury, Conn.—This company intends to double-track its line from Oakville to Waterbury. The company will also relocate some of its lines in Oakville.

Tampa (Fla.) Electric Company.—Among the many improvements planned by this company in the near future will be the extensions of its lines in various directions, the new union depot route connecting Ybor City and other sections of Tampa, and the connecting of the tracks of the company with those of the Tampa & Sulphur Springs Traction Company.

City & Suburban Railway, Brunswick, Ga.—This company has begun the extension of its line on L Street to Brunswick.

Alton, Jacksonville & Peoria Railway, Jerseyville, Ill.—Mayor J. M. Page has informed Frank L. Butler, receiver for this railway, that the local franchise of the company, which expires July 1, will not be renewed. As the streets have been torn up for a year and the creditors object to receivers' certificates, the plans for the completion of the construction are in abeyance.

***Peoria, Ill.**—Plans are being considered to build an electric railway between Peoria and Keokuk, Ia. Mr. Lawson, Columbus, Ohio, is interested.

Quincy & Western Illinois Electric Railway, Quincy, Ill.—Plans are being made by this company to begin soon the construction of this 58-mile electric railway from Quincy to Eubanks, Elvaston and Niota. Power will be furnished by the Mississippi River Power Company, Keokuk. Henry Dayton, Quincy, president. [E. R. J., Jan. 3, '12.]

St. Joseph Valley Traction Company, Elkhart, Ind.—This company has awarded a contract to electrify the Bristol-Lagrange division of its line to the Westinghouse Company.

Evansville & Indianapolis Light, Power & Electric Railway, Evansville, Ind.—This company advises that no definite plans have been decided upon as yet for the construction of this 150-mile electric railway to connect Evansville, Oakland City, Washington, Bloomfield, Worthington and Indianapolis. The company will furnish power for lighting purposes. Capital stock authorized, $8,000. Arthur C. Stone, 113 Upper Fourth Street, Evansville, is interested. [E. R. J., June 8, '12.]

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—Charles L. Henry, president of this company, stated recently that a route for the extension of the line to Cincinnati would be selected by Aug. 1. Three routes have been surveyed and consents secured. One is from Rushville by way of Brookville, another through Hamilton by way of Connersville, and the third from Greensburg by way of Batesville.

Southwestern Traction Company, Indianapolis, Ind.—This company will begin construction in about two months on its 87.6-mile electric railway to connect Indianapolis, Mars Hill, Joppa, Mooreville, Monrovia, Gasburg, Hall, Eminence, Quincy, Sante Fe, Carp, Spencer, Cataract, Poland, Centerpoint, Prairie City, Seeleyville, Cherryvale, Watkins and Terre Haute. Electricity will be used for passengers and steam for freight. Capital stock authorized, $50,000, preliminary; issued, $29,000. Bonds authorized, $3,000,000. The repair shop will be located at Mars Hill. Headquarters, 719 Law Building, Indianapolis. Officers: John W. O'Hara, president; John L. Bienz, vice-president; Joseph A. Davidson, secretary, treasurer and purchasing agent, and Thomas H. Grave, chief engineer, all of Indianapolis. [E. R. J., Feb. 17, '12.]

Tri-City Railway & Light Company, Davenport, Ia.—This company will begin at once the construction of its Fourth Street line in Moline in compliance with its franchise agreement.

Fort Dodge, Des Moines & Southern Railroad, Des Moines, Ia.—Judge McPherson of the District Court of the United States for the Southern District of Iowa has authorized an issue of receivers' certificates by this company which will provide $60,000 for the construction of a new steel bridge near Boone.

Union Traction Company, Coffeyville, Kan.—This company, which is now building its line northeast from Cherryvale, has asked the citizens of Parsons to vote on a $17,500 bond issue to insure the extension of this line through Parsons.

Alexandria (La.) Electric Railway.—During the next sixty days this company will award contracts to build 1 mile of new track.

New Orleans & Western Railway, Gretna, La.—This company, which was recently incorporated to build an electric railway between Gretna and Waggaman, has elected the following officers: Charles D. Warren, president; C. E. A. Carr, general manager of the Algiers Railway & Lighting Company, New Orleans, vice-president, and E. Howard McCaleb, secretary. [E. R. J., June 29, '12.]

Worcester (Mass.) Consolidated Street Railway.—Plans are being made by this company to extend its line from Worcester to Athol, through Paxton, Barre and Petersham.

Lansing, Mich.—Interest has been revived in the electric railway project between Lansing and Grand Ledge. Two years ago considerable work was done toward grading the right-of-way. George H. Kneal, Lansing, Mich., is interested. [E. R. J., July 16, '12.]

St. Paul Southern Electric Railway, St. Paul, Minn.—A guarantee fund of $100,000 is being raised by the citizens of St. Paul to insure the equipment for this railway now being constructed from St. Paul to Hastings. This is part of a plan to build an interurban railway to connect St. Paul, Hastings, Cannon Falls, Red Wing, Frontenac, Lake City, Mankato, Inver Grove and Faribault. W. L. Sonntag, St. Paul, general manager. [E. R. J., April 27, '12.]

Billings (Mont.) Traction Company.—During the summer this company intends to build three new lines.

Albany Southern Railroad, Hudson, N. Y.—Plans are being considered by this company for the construction of an extension from Albany to Pittsfield. The plans call for the extension from the end of the company's line at Schodack Point to the state line, where the Pittsfield Electric Street Railway will meet the extension by constructing a new addition to its present route into the center of Pittsfield.

Western Ohio Railway, Lima, Ohio.—The Public Service Commission has ruled that the $360,000 of bonds issued to build the Fort Laramie-Covington extension of 11 miles must be sold at 90, instead of 80 as the organization interested in the extension proposed.

Toledo Railway & Light Company, Toledo, Ohio.—This company has awarded the contract for double-tracking its Monroe Street line to the Russell & Jennison Company.

Niagara Falls, Welland & Lake Erie Railway, Niagara Falls, Ont.—It is reported that this company will build a new line between Welland and Port Colborne within the next few months. C. J. McLaughlan, Toronto, general manager.

Toronto (Ont.) Suburban Railway.—The Ontario Railway Board has ordered this railway to rebuild its line on Bathurst Street and Davenport Road and lay a pavement between the rails and 18 in. on either side.

***Kane, Pa.**—Plans are being made to build a 12-mile electric railway between Kane, James City and Mount Jewett. Among those interested are J. C. Bell and W. M. Rohn, Jamestown.

Sioux Falls (S. D.) Traction Company.—Work has been begun by this company on its extension to Sherman Park, Sioux City.

Fort Worth (Tex.) Southern Traction Company.—This company has completed the track laying on its 32-mile electric railway between Fort Worth and Cleburne. The line between Fort Worth and Burleson will be placed in operation at once.

Fairmont, Clarksburg & Grafton Railway, Clarksburg, W. Va.—Three large bridges over the Valley River and five creek bridges will be built by this company in the near future. Charles F. Sutherland, Morgantown, president. [E. R. J., May 25, '12.]

***Graham, W. Va.**—A. W. Stover, Dayton, Ohio, and J. M. Hane and C. S. Israil, Columbus, Ohio, are considering plans for an electric railway in Graham. The promoters are said to represent the J. G. Russell Company, Dayton.

Morgantown & Dunkard Valley Railroad, Morgantown, W. Va.—Bids are being asked by this company for the construction of the extension from Cassville to Blacksville, a distance of 14 1-3 miles. Plans and specifications for the extension have already been drawn up.

SHOPS AND BUILDINGS

British Columbia Electric Railway, Vancouver, B. C.—This company plans to build new carhouses and repair shops at Kitsalano.

Los Angeles (Cal.) Railway.—This company's carhouse at Alameda and Industrial Streets, Los Angeles, was damaged by fire on June 27. The loss is estimated to be about $12,000.

Louisville & Interurban Railway, Louisville, Ky.—This company has made arrangements with the city of Shelbyville to build a new freight station on Main Street between Second and Eighth Streets in Shelbyville.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company is considering plans to build a new freight station on East Seventh Street, Canton.

Columbus, Newark & Zanesville Electric Railway, Newark, Ohio.—This company has been authorized by the Public Service Commission to expend $25,000 in station improvements in Newark.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company's freight house at Toronto was destroyed by fire on June 23. The loss is said to be about $1,000.

Philadelphia (Pa.) Rapid Transit Company.—This company plans to build a new carhouse at Tenth Street and Luzerne Street, Philadelphia, to be used to house the new near-side cars. The structure will cost $500,000.

POWER HOUSES AND SUBSTATIONS

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company has purchased for installation in connection with the operation of its Terre Haute division a 6250-kva, two-phase, 60-cycle horizontal steam turbine and has ordered Wheeler condensers and pumps to be installed with this machine.

Southern Iowa Traction Company, Centerville, Ia.—This company plans to build a new power plant in Centerville.

Louisville (Ky.) Railway.—This company, which has begun the construction of a power plant, has let the contract for the structural work to the Louisville Bridge & Iron Company. The Henry Vogt Machine Company, Louisville, will construct the coal and ash bins, which will require about 600 tons of heavy plates and angles. The handling of the fuel and refuse will be by means of tramcars, hand power being used. The contracts for the equipment are being let by F. H. Miller, superintendent of motive power of the company.

East St. Louis, Columbia & Waterloo Railway, St. Louis, Mo.—Contracts will be awarded at once by this company for the construction of a new substation in East St. Louis. The building will be one story high, 55 ft. x 30 ft., and of brick construction.

Johnson City (Tenn.) Traction Company.—A power plant with capacity of 7500 hp, to cost approximately $500,000, will be built by the interests which have taken over the Johnson City Traction Company, referred to in the department "Financial and Corporate" elsewhere in this issue. W. V. N. Powelson, New York, N. Y., will be engineer in charge of construction.

Memphis (Tenn.) Street Railway.—Preliminary work for this company's new addition to its power house has been begun. The improvements include two new brick smokestacks 250 ft. high. Other features will be improved arrangements of coal bunkers, which are to be located at the top of the structure. Automatic stokers are to be installed. A 24,000-hp battery of boilers will be erected and a 2000-kw generator will also be installed. Contractors for the building are Meers & Dayton Company, Chattanooga. The General Concrete Construction Company, St. Louis, will erect the stacks.

Fort Worth (Tex.) Southern Traction Company.—This company has completed its two substations on the Cleburne line. One is about 1½ miles north of Burleson, the other 3 miles north of Cleburne.

San Antonio (Tex.) Traction Company.—This company will award a contract for the installation of a new 300-kw generator at its substation on Grove Avenue.

Manufactures and Supplies

ROLLING STOCK

Pittsburgh (Pa.) Railways has ordered fifty trail cars from the Standard Steel Car Company.

Pacific Electric Railway, Los Angeles, Cal., has ordered forty-nine cars from the Jewett Car Company.

Aroostook Valley Railway, Presque Isle, Maine, has ordered two car bodies from the Wason Manufacturing Company.

New York Central & Hudson River Railroad, New York, N. Y., has issued specifications for twenty-five motor cars and five trail cars.

Newport News & Old Point Railway & Electric Company, Newport News, Va., has ordered six semi-convertible cars from The J. G. Brill Company.

Tyler (Tex.) Traction Company has ordered four 45-ft. 4-in. passenger cars, one 45-ft. express car and one 40-ft. freight trail car from the Cincinnati Car Company.

Pottstown & Phoenixville Railway, Pottsville, Pa., has ordered three 30-ft. 8-in. semi-convertible pay-within motor bodies mounted on Brill 27-M.C.B.-1 trucks from The J. G. Brill Company.

Portsmouth Street Railroad & Light Company, Portsmouth, Ohio, has ordered four 28-ft. semi-convertible single-end motor car bodies mounted on Brill 27-GE-1 trucks from the G. C. Kuhlman Car Company.

Helena Light & Railway Company, Helena, Mont., has ordered one 28-ft. 10½-in. semi-convertible motor car body mounted on Brill 27-GE-1 trucks from the American Car Company, through J. G. White & Company, New York.

Oregon Electric Railway, Portland, Ore., is in the market for thirty-one 60-ft. four-motor coaches, of which twenty-five will be double-end passenger cars and six will be combination baggage and passenger single-end cars.

Washington Railway & Electric Company, Washington, D. C., has ordered thirty 41-ft. semi-convertible center-entrance cars and five 46-ft. semi-convertible center-entrance cars from The J. G. Brill Company, twenty cars from the St. Louis Car Company and ten cars from the Southern Car Company. The J. G. Brill Company has also received the order for five Brill 27-GE-1 plow carrier trucks and five Brill 27-E-1 non-plow carrier trucks.

TRADE NOTES

Lenoir Car Works, Lenoir City, Tenn., are said to be considering the enlargement of their plant. The car wheel foundry will be one of the departments to have an increased capacity.

Curran & Mead, New York, N. Y., publicity managers, announce that Larkin G. Mead has acquired the interest of Mr. Curran in the firm of Curran & Mead and will hereafter conduct its business under his own name at the same offices as heretofore, 55 Park Row.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has called a special meeting of its stockholders for July 29, 1912, to vote upon a proposition to dissolve the corporation in accordance with the unanimous opinion of the board of directors and a committee of three stockholders other than directors.

D. W. Call, former president of the Allis-Chalmers Company and one of the receivers, has resigned as receiver, and the court has decided that Otto H. Falk, who was co-receiver with Mr. Call, shall remain, as sole receiver. Orders will be filed in the federal courts soon making Mr. Falk the ancillary receiver also.

Imperial Car Company, Hamilton, Ont., has been organized with a capital stock of $6,000,000 to erect a plant on a fifty-acre site on the water front east of the city limits of Hamilton. Among the directors of the company are W. G. Ross, Montreal; G. H. Cahan, Montreal, president of the Western Canada Power Company; Sir Henry Pallatt, and Basil Magor, Passaic, N. J., former president of the Magor Car Company of that place, in whose hands the management of the new company will be.

American Car & Foundry Company, Berwick, Pa., reports net earnings for the year ended April 30, 1912, as

$4,193,750, as compared with $6,240,324 for the previous year. The charge of $1,354,519 renewals, repairs, etc., left a balance available for dividends of $2,839,232, against $4,234,789 in the previous year. After payment of dividends there was a surplus of $139,232, against $1,534,789 last year. There was no charge to correspond with the $759,000 put out for maintenance and improvements during 1910-11. The surplus is $24,876,576.

National Brake & Electric Company, Milwaukee, Wis., has prepared plans for a new foundry to be constructed adjoining its present plant. The main building will be 80 ft. x 240 ft., with two wings each 80 ft. x 120 ft., and two stories high. It will be equipped with a 15-ton to 20-ton, 80-ft. span traveling crane, two 5-ton jib cranes, one 40-ft. span traveling crane and one 20-ft. traveling crane. There will also be a complete installation of cleaning and tumbling machinery, core ovens, etc. The foundry will be used entirely for the making of gray iron castings for the company's own use.

The J. G. Brill Company, Philadelphia, Pa., has received the following orders for trucks: American Railways for Roanoke Railway & Electric Company, Roanoke, Va., two Brill 27-GE-I trucks and twelve Brill 39-E trucks; Boston (Mass.) Elevated Railway, forty Brill 27-M.C.B. trucks; Birmingham Railway, Light & Power Company, Birmingham, Ala., two Brill 27-M.C.B.-I trucks without wheels; Pacific Electric Railway, Los Angeles, Cal., ninety-eight Brill 27-M.C.B.-3-X trucks without wheels and axles and thirty-six Brill 27-GE-I trucks without wheels and axles; Yakima Valley Transportation Company, North Yakima, Wash., six Brill 27-M.C.B.-2-X trucks without wheels and axles; Aroostock Valley Railroad, Presque Isle, Maine, four Brill 27-M.C.B.-2 trucks.

Electric Properties Company, New York, N. Y., has been taken over by a syndicate composed of the Westinghouse Electric & Manufacturing Company, the Equitable Trust Company and William Morris Imbrie & Company, New York, as a medium for dealing in the securities of public service corporations. The Electric Properties Company was incorporated in New York in May, 1906, to finance and develop electric lighting and electric railway companies. Its authorized capital consists of $6,000,000 of common stock and $6,000,000 of 6 per cent cumulative preferred stock. The Westinghouse Machine Company has controlled the Electric Properties Company through ownership of $5,000,000 of the common stock. Through ownership of the entire capital stock of Westinghouse, Church, Kerr & Company, the Electric Properties Company has carried on a general engineering and construction business. The purchasing syndicate plans to enlarge the company's field of operation and acquire new properties.

M-C-B Company, Chicago, Ill., which was recently organized as noted in the Electric Railway Journal of June 15, 1912, will have the following officers and stockholders: Walter E. Marvel, president; Erle C. Cowgill, secretary and treasurer; Frank A. Buckley, vice-president. Mr. Marvel was for several years manager of the St. Louis branch of the Buda Company, Chicago, and later Western sales manager of the Detroit Seamless Steel Tubes Company, Detroit, Mich. Mr. Cowgill is assistant to President Markham of the Illinois Central Railroad, and will sever his connection with that road on July 1. Mr. Buckley is Western representative of the Armspear Company, New York, and the Central Railway Signal Company, of Pittsburgh. The Chicago offices will be located in the McCormick Building. The M-C-B Company, in addition to making several of its own patented devices, has secured the exclusive sole rights in Western territory of some of the following lines: Miscellaneous cars for electric railways; snow plows, flangers, sweepers and ice diggers for steam and electric lines; pneumatic tools for railway shop work; track and bonding drills, tool grinders, cattle guards, jacks, handmade chains, locomotive water gages, track tools, anti-rail creepers, portable kerosene lights, etc.

Hall Signal Company, New York, N. Y., through the reorganization committee, has notified the stockholders that after considering the opinion expressed by several stockholders to the effect that the new 7 per cent cumulative preferred stock of the new company to be formed under the plan as announced on April 2 last, should be sold to stockholders at less than par, the committee has decided to modify the plan and to sell the preferred stock at the rate of $80 for each $100 share. Each stockholder is entitled to subscribe on or before July 15 next for an amount of the preferred stock in the new company equal to 62½ per cent of his stock in old concern. Under the plan as modified each stockholder for each $100 subscription will receive $125 preferred stock and $200 common stock in the new company. In order to make this change the authorized issue of the preferred stock will be increased by $250,000 to $2,250,000, of which $1,250,000 will be sold and $1,000,000 will be retained in the treasury. The committee states that it has relinquished its claim on the $500,000 of common stock which was to be paid to it under the original plan for its service and those of counsel and to cover expenses, and that this amount of stock will be divided up among all stockholders of the company, provided the plan is agreed to. An underwriting syndicate has been formed which has agreed to take over the stock of the new company not subscribed for by present stockholders. Each subscriber to the underwriting syndicate will receive 5 per cent in cash and 50 per cent in common stock. The reorganization committee is composed of Jules S. Bache, Newman Erb, William Fellows Morgan, William P. Hall and George Q. Horowitz. Edward P. Goetz is secretary.

ADVERTISING LITERATURE

Chicago Pneumatic Tool Company, New York, N. Y., has issued Booklet No. 115 entitled "The Anatomy of the Little Giant," which fully describes and illustrates the Little Giant commercial car.

Hess-Bright Manufacturing Company, Philadelphia, Pa., is mailing a reprint of a report made by George W. Bond, Hartford, Conn., a measuring expert. This report covers the inspection and measurements of two ball bearings taken from one of the journals of a car on the Atlantic City & Shore Railroad which has been in service for four years and has run between 150,000 and 200,000 miles.

The J. G. Brill Company, Philadelphia, Pa., prints in the *Brill Magazine* for June an illustrated biographical sketch of Herbert E. Blain, president of the Municipal Tramways Association of Great Britain. Christiania, Norway, is the subject of the forty-second article of the series which describes conditions governing the type of car for city service. The International Street & Interurban Railway Association is now holding its meeting at Christiania. Among other articles in the magazine are the following: "Sixty More Semi-Convertible Cars for Baltimore," "Cars for the Southwestern Traction & Power Company," "Additional Pay-as-You-Enter Cars for Lynchburg, Va.," "Twin-Window Semi-Convertible Cars for Morgantown, W. Va."

NEW PUBLICATION

The Pennsylvania Railroad Company's New York Terminal. 131 pages. Isaac H. Blanchard Company, New York. Cloth, $2.

The Pennsylvania Railroad has had published for general distribution a description and history of the engineering undertakings which it has completed and is still carrying on in connection with its New York terminal. Of these the ones best known to the public are the station in New York City and the tunnels under the North and East Rivers. Not less important, however, than these, although not brought before the public so prominently, are the freight yards on Long Island, the Montauk cut-off and the bridge over the East River, together with the track and bridge construction necessary to complete the general improvement plan. The bridge over the East River will not be completed for several years, but it is one of the most notable of all of these unusual projects, as it will, when completed, furnish an unbroken rail line via New York from Quebec to the southernmost extremity of Florida. The book is profusely illustrated with maps and photographs of features of the various undertakings. The publishers have also prepared a condensed edition which is listed at $1.

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ELECTRIC RAILWAY JOURNAL

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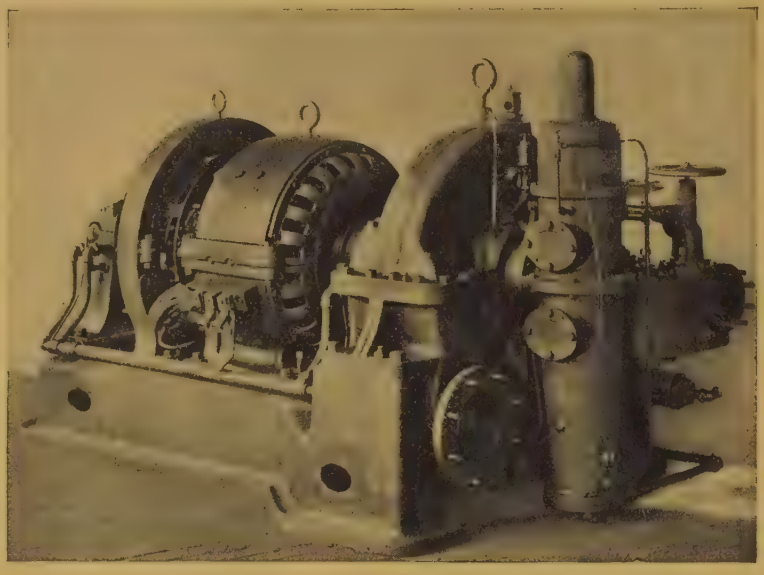

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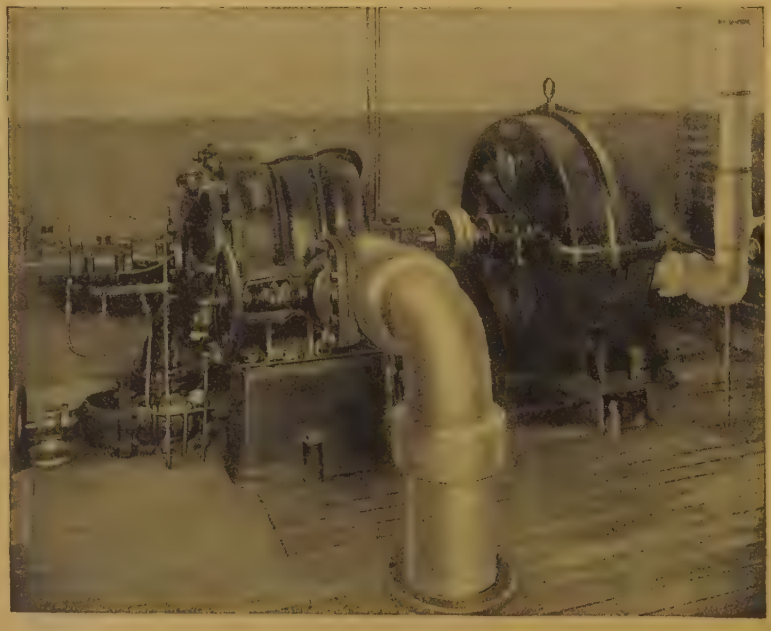

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EXHIBITS AT CHICAGO

The exhibit committee, which has charge of the arrangements for the exhibits at the Chicago Convention, has been very busily engaged in perfecting its arrangements and is able to announce the assignments this year earlier than usual. The list of manufacturers who have so far applied for space, with the area which has been assigned to them, is published elsewhere in this issue. As shown, the space already taken amounts to 66,235 sq. ft., which is about 12,000 sq. ft. more than on the same date last year, and the committee believes that by the time the convention opens the exhibit will exceed both in space occupied and in interest of exhibits that of 1911. The Manufacturers' Association expects to invite to the exhibit all of the prominent engineers in the Chicago district, including those in the power stations and isolated plants, and the parent association is arranging its program and plans so that all delegates will have ample time to inspect the apparatus shown. One important feature, so far as the delegates are concerned, will be the track exhibit of cars, for which the facilities at Chicago are unsurpassed. This has always been one drawback at Atlantic City for an electric railway convention. There, in spite of the fact that cars, after all, constitute the object of perhaps the greatest interest to the convention delegates, it has been impossible to do more than to provide space for a few very light cars near the entrance to the hall and place the others, including all of the heavy cars, on a side street three or four blocks away. At Chicago the cars will be in the same group of buildings as the rest of the exhibits with which they will form an integral part. This is especially desirable this year because of the recent developments in car design, and the exhibit committee hopes to be able to secure for the Chicago exhibit cars of all of the most prominent types which have been brought out recently and to have before the convention opens a much larger exhibit of cars even than that shown on the printed list. The committee is to be congratulated upon the work it has undertaken to develop this branch of the exhibit.

THE LAWRENCE HALF-FARE CASE

The effect of fare reductions upon the earnings of a street railway is one of the most important questions which the industry is ever called upon to study. Any factor which strikes directly at revenue without offering the compensation of increased future profits from an enlarged volume of traffic is a most serious influence against a reasonable return upon the capital investment, and deserves the most thorough investigation. In another column of this issue are printed the results of five years' operation of the so-called half-fare acts of Massachusetts on the northern lines of the present Bay State Street Railway Company's system, the figures having been prepared in connection with the company's brief in the Lawrence half-fare case, recently decided in favor of the Commonwealth against the Boston & Northern Street Railway by the Supreme Court of Massachusetts. The data show, both in

totals and in unit analysis, the adverse effects of the half-fare statutes, and apart from the probable appeal of the case to the Supreme Court of the United States are of unusual interest to the operating man. The figures prove that the average cost of carrying each passenger in terms of operating expenses alone increased during the period from 1906 to 1910 from 3.16 to 3.37 cents, and that the imposition of the half-fare act applying to pupils of public and private schools attended by children and youths resulted in a loss of 0.66 cent in 1906 and 0.87 cent in 1910 per pupil thus transported, taking merely operating expenses into account. When operating expenses and fixed charges are included, the average cost of carrying each passenger was 4.18 cents in 1906 and 4.51 cents in 1910, while the loss per pupil carried at the 2.5-cent rate on this basis was 1.68 cents in 1906 and 2.01 cents in 1910. Thus the increased cost of living borne by the street railway company is indicated, but, beyond this, the burden of an increase in half-fare ticket sales of from 693,690 in 1906 to 960,030 in 1910, or a gain of over 38 per cent in this volume of costly traffic, added to the economic disadvantages under which the system worked, and indirectly, at least, forced a condition under which the very moderate dividends of 5 per cent earned each year had to be supplied to an undue extent by other classes of patronage.

SPECIAL MACHINE TOOLS

During a recent trip through several electric railway shops it was noticed that only one of them was equipped with a vertical boring mill, although a number had car-wheel boring machines. The latter is a strictly special tool. On it wheels may be bored, and if it is equipped with a hub-facing attachment wheel hubs may be squared up, but this is the absolute limit of its uses. When there are no wheels to be bored—and it is, by the way, a very large shop which can keep a car-wheel borer busy all of the time—the machine is standing idle. The vertical boring mill, on the other hand, may be classed as a tool for general use. Not only will it serve for boring wheels and forcing hubs, but it can be used for any boring or facing operation ordinarily done with a chuck in a lathe. For small work—that is to say, for pieces not larger than the boring mill table—it will take a cut over a flat surface in about half the time required by a planer. For any turning or boring work which is chucked and not centered it is infinitely better than a lathe, for the reason that the work does not have to be supported while it is being clamped to the table or gripped in the chuck. Especially with heavy pieces this point of difference is marked, as the difficulty of holding work against the vertical face plate of the lathe complicates the operation. The vertical boring mill in the size equivalent to that of the ordinary car-wheel boring machine will cost somewhat more than the latter, but the fact that it can be kept at work a vastly greater percentage of the time makes this objection to it of insignificant importance. The work in electric railway machine shops does not cover operations carried out on a very large scale. It is, as a rule, diverse in character. In fact, outside of the very largest systems, practically no work is repeated often enough to warrant the purchase of expensive special machines. Even the car-wheel borer, although devoted to one of the largest single items of electric car repairs, is not exempt. When interest and depreciation charges on machine, foundation, shop space and transmission machinery are figured up for a tool which is idle for 90 per cent of the time, they will be found to amount to three or four times the labor cost of the work done. These charges, of course, possess the doubtful advantage of not appearing directly on the shop cost records, but they will appear in the company's balance sheet whether they are neglected temporarily or not.

MONTHLY EARNINGS AND INCREASED EXPENSES

A comparison of gross earnings of some of the electric railway companies which make regular monthly reports shows some differences that are rather unusual.

The figures of earnings furnished by seven companies, which were selected at random, were used in the comparison. One of these companies is a holding property which does not operate directly and furnishes figures of the gross earnings of subsidiaries. The other companies report gross revenues, operating expenses and net revenues. More than half of the companies are engaged in the business of furnishing other utility service, such as light and power, in connection with railway operations. With the exception of the Northern Texas Electric Company, which reports for April, the monthly figures of the companies are for May. Six of the properties report gains in gross earnings for the month. All but one, however, show an increase in operating expenses for the month that is greater in percentage than the gain in gross revenues. The gains in gross revenues, as compared with the corresponding month of the previous year, extend from 3.7 per cent for the Philadelphia Rapid Transit Company to 11.5 per cent for the Northern Ohio Traction & Light Company. Between these records are the following increases: Aurora, Elgin & Chicago Railroad, 4.3 per cent; Twin City Rapid Transit Company, 4.8 per cent; Northern Texas Electric Company, 6.5 per cent; Detroit United Railway, 10.2 per cent. The American Railways Company reported for its subsidiaries a decrease of 0.2 per cent for the month.

The increase in operating expenses is measured, like the increase in gross operating revenues, by the percentage of change. Naturally the operating expenses under normal conditions will tend to increase as the business and earnings increase. If the percentage of increase in operating expenses is larger than the percentage gain in gross revenues, it reduces or eliminates the possible improvement in net earnings. If a property is well maintained and good service is furnished, it should be able to increase its gross and net earnings at a rate at least equal to the increase in its operating expenses; that is to say, some benefit should be realized from increased density of traffic. All the increase should not disappear in greater operating expenses. However, the costs of labor and material per unit, which are not always in the control of the railway, mount unexpectedly and in such a way that the company is virtually helpless. Many companies have not been able to reserve for net earnings a fair proportion of the natural increase in gross earnings. If we take a property with a gross earning capacity of $100,000 and for simplicity assume an operating ratio of 50 per cent, although that is pretty low, we would have operating expenses of $50,000 and net earnings of a like sum.

If there was a gain of 5 per cent in gross earnings, and operating expenses increased in the same ratio, the additional balance available for net revenue would be equal to 5 per cent on that amount. If, however, with an increase in gross revenue of 5 per cent the operating expenses showed an increase of 7 per cent the increase in net earning power would be but 3 per cent. This illustrates something like what appears to have taken place with many properties.

The increases in operating expenses for the month were as follows: Aurora, Elgin & Chicago, 4.8 per cent; Northern Ohio, 14.6 per cent; Detroit, 11 per cent; Twin City, 6.4 per cent; Philadelphia Rapid Transit Company, 4.6 per cent; Northern Texas Company, 2.3 per cent. The result on net earnings is what would be expected from these figures. The increases in net revenues for the month were as follows: Aurora, Elgin & Chicago, 3.5 per cent; Detroit, 8.9 per cent; Northern Ohio, 7.9 per cent; Philadelphia Rapid Transit, 2.4 per cent; Twin City, 3.4 per cent.

When we take up the results reported by the companies for the cumulative period of five, eleven or twelve months, it becomes apparent that in nearly every case the showing is better than the results indicated for the period of one month. For instance, the subsidiary properties of the American Railways Company, which showed a slight decrease in May, gained 5.6 per cent in gross during the eleven months ended May 31. In the same period, the Aurora, Elgin & Chicago gained 5.7 per cent in gross and the Philadelphia Rapid Transit Company 5.5 per cent. In the period of five months ended with May, the Northern Ohio company gained 12.6 per cent, the Detroit company 12.6 per cent and the Twin City company 4.3 per cent. The Northern Texas company also gained a little more in the longer period of twelve months ended with May than in the single month, increasing 7.7 per cent. A majority of the companies also showed in the longer period a larger percentage of increase in operating expenses than in gross revenue. Expenses increased as follows in the cumulative period: Northern Texas company, 5.8 per cent; Aurora Elgin & Chicago, 3.4 per cent; Northern Ohio company, 13.6 per cent; Detroit company, 14.8 per cent; Twin City company, 6.9 per cent. The Philadelphia Rapid Transit Company showed in eleven months an increase of 5.8 per cent.

The changes in net operating revenues for the longer period are not so nearly uniform in tendency as the differences for the shorter periods. For instance, the Northern Texas company gained in twelve months 10.1 per cent in net. The Aurora, Elgin & Chicago gained 8.9 per cent in eleven months and the Philadelphia Rapid Transit Company 5 per cent. During the period of five months the Northern Ohio company increased 11.2 per cent, the Detroit company 8.8 per cent and the Twin City company 1.5 per cent.

The figures show principally seasonal changes in gross and afford no basis upon which anyone can controvert the statement that except when business conditions in the community are subject to extraordinary influences electric railway earnings continue to increase steadily. The tendency indicated in some of these reports about which railway managers need to concern themselves is the increase in operating expenses on properties where it is disproportionate to the gain in gross earnings.

THE NEW STANDARD FOR PIPE FITTINGS

At a recent hearing in Washington, held for the purpose of discussing the practicability of the immediate adoption of the 1912 standard for flanges and fittings, the consensus of opinion was that the interests of all concerned would be best conserved if the Government went upon record at once by drawing future specifications according to the new standard. It must, of course, be admitted that in any change in standards practically the entire cost is borne by the manufacturers, but the hearing brought out the point that in this case the burden was not by any means prohibitively heavy owing to the general absence of costly special tools in the processes of manufacture.

Piping standards have in the past had a checkered existance. The vast complication caused by the numerous variables, the different pipe sizes, the many steam pressures and the infinite number of possible combinations in face-to-face dimensions of the various types of fittings, make the problem exceedingly difficult of solution. However, the old standard of the American Society of Mechanical Engineers adopted for pressures up to 125 lb. per square inch showed the possibilities in this direction, although its scope included nothing more than flange design. In the new standard for high pressures the joint committee has not only provided a series of standard flanges for use with pressures from 125 lb. up to 250 lb. per square inch, but has also specified facing dimensions for low-pressure fittings under the old standard and for high-pressure fittings under the new.

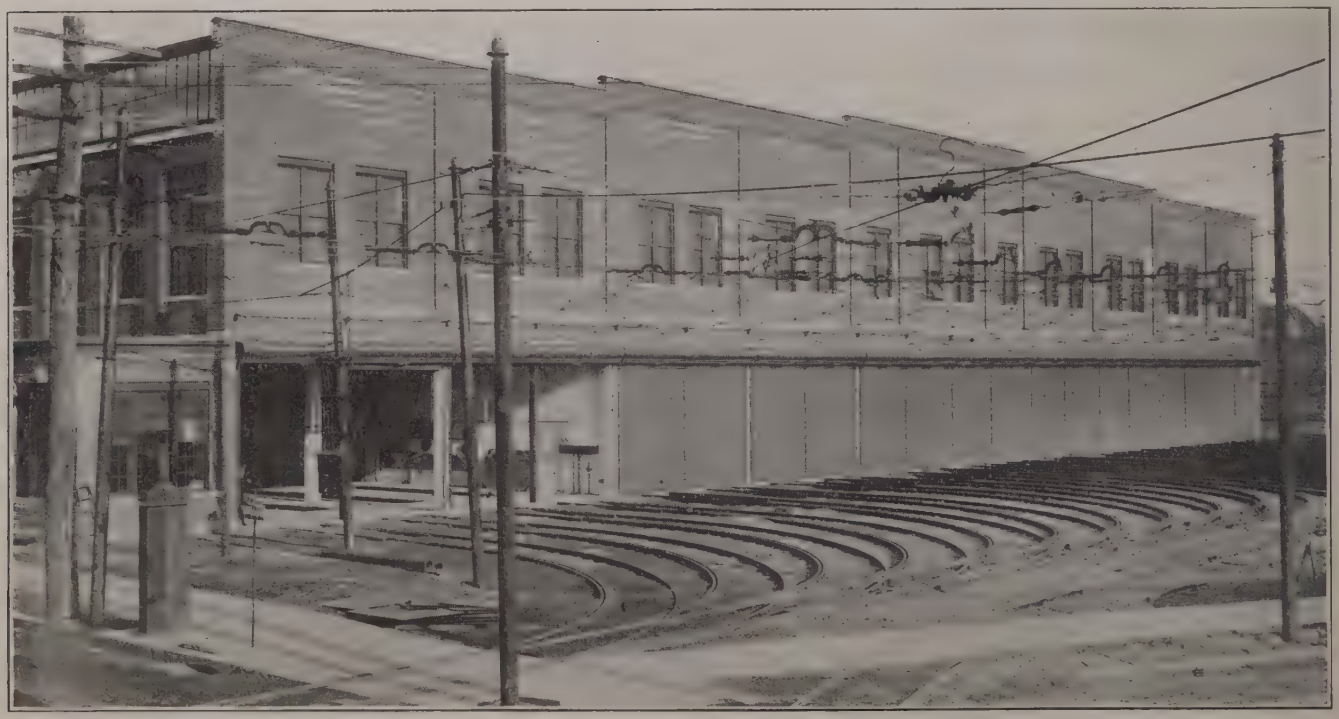
The complaint against the recommendation for a new standard is only natural, but the necessity for something to supersede the one existing at present for use with high pressures, and known as the Manufacturers' Standard, is the inevitable result of the hasty adoption of an improper design. It was shown in the report of the committee to the American Society of Mechanical Engineers, published last February, that the flange bolts for the large pipe sizes had a factor of safety of only 2 and, in some cases, even less than that. Manifestly such a condition could not be perpetuated. Incidentally it may be remarked that the necessary additional strength in the 1912 standard schedule has been obtained by increasing the size of bolts, and that the number per flange is the same as in the old standard.

The specification of facing dimensions for fittings will undoubtedly involve more expense to manufacturers than the change in the flanges. There is, however, a crying need for uniformity in this regard. Piping layouts, except for very small power plants, absolutely must be dimensioned, and when draftsmen have an opportunity to read a correct dimension out of the wrong catalog there exists the possibility, in fact the probability, of an error which will cause considerable expense, and what is generally worse, serious delay. The engineering of piping systems has progressed far enough so that rational and complete standards for material can be adopted. It should not be necessary in the case of a cracked tee to have first to find out who made it and then wire to the factory only to learn that it is of special design and not carried in stock. The new standard is scientifically correct, and it represents the continued efforts of a committee of thoroughly practical users of pipe and fittings. Its ultimate adoption is inevitable, and the more promptly that it is accepted the less will be the cost of the change.

New Haven Carhouse of the Connecticut Company

A Two-Story Carhouse for 400 Double-Truck Cars with Grade Entrances for Each Floor

The Connecticut Company has lately completed at New Haven one of the largest carhouses in the country and one particularly interesting because it is a two-story structure with grade entrance for each floor. The New Haven division consists of some 142½ miles of trackage, chiefly urban. Until a short time ago practically every car on the division passed over the intersection of Chapel and Church Streets. Although it recently has been possible to relieve this condition to some extent, most of the lines are still obliged to have this common point, and those which do avoid it must pass near. As a result, a heavy draft of cars to meet weather or load emergencies causes much congestion at the center at best and makes desirable as many routes as possible. This fact was prominent in the decision to locate the new carhouse some distance from the older facilities on Grand Avenue and on a different line leading to the center of the city.



New Haven Carhouse—View with Utilities Section at the Extreme Left

The site, formerly used as a steam railroad gravel pit, is 1½ miles from the center of New Haven. It is bounded respectively by James Street, State Street, Blatchley Avenue and the main line of the New York, New Haven & Hartford Railroad. Double tracks on State Street give a direct route to the center of town. Double tracks on James Street furnish a direct connection to the older Grand Avenue carhouses and shops and an indirect route to the center, and a branch-off from the low-level ladder gives a physical connection with the steam railroad.

The low-level entrance is from the corner of State and James Streets; the upper-level entrance from State Street near Blatchley Avenue. The grade of State Street with a little development in the entrance gave the necessary 17 ft. of rise.

CONSTRUCTION

The structure consists of the two-story building proper, 452 ft. 8 in. long x 252 ft. 10 in. wide over all. Each floor has twenty tracks 450 ft. long, a total of 3.41 miles of track under cover, with a capacity of 400 double-truck cars or 600 single-truck cars. Four 12-in. brick firewalls, extending 18 in. above the roof, divide the building into ten sections, each with four tracks. Cross communication is obtained by four sets of double sliding firedoors on each floor for each wall.

On the State Street side there is a single-story office and utilities section 312 ft. 8 in. long x 15 ft. wide, while on the railroad side is a brick valve house 30 ft. long x 14 ft. wide, containing the valves and pressure tank which control the sprinkler system of the two southerly sections of each floor.

The State Street side, the easterly end and the railroad side require heavy retaining walls. The end wall serves also as part of the building foundations; the side walls are kept from the building as far as possible to provide areaways for light. As the building is intended almost entirely for storage, comparatively little space is needed for the utilities section, which is 15 ft. wide and extends along a part of the State Street side.

The starters' room, at the front, 20 ft. 3 in. long, has Keene's cement wainscot, plastered walls and ceiling, hardwood floor and ash trim. Here is located the main station of the Eco watchman's clock system and an annunciator of the automatic sprinkler system.

The lavatory, 32 ft. 2 in. long, and the conductors' and motormen's room, 70 ft. long, are finished like the starters' room except as to the floor, which is of cement. The lavatory contains ten closets, eleven bowls and thirteen urinals; the conductors' room has a drinking fountain and 130 steel lockers, 12 in. x 18 in. x 72 in., with sloping tops. An inclosed stairway leads from this latter room to the upper level.

The storeroom, 28 ft. 11 in. long, carries so little stock

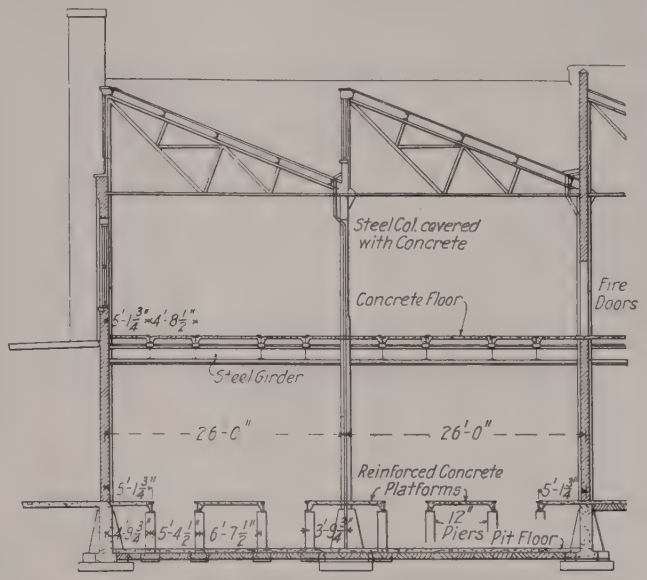
that no special devices are needed. Like the remainder of the rooms it has a cement floor and is finished in cold-water paint. In the salt and sand room a small space is reserved for bags of salt, but the greater part of its 60 ft. of length is taken up by the sand-drying stove and the storage bin. Wet sand is delivered by cars from the first operating track, and after having been dried is blown by an air-lift into the storage bin, from which it flows by gravity through long spouts directly to the cars, or through short spouts to bags or pails.

The pumproom, 30 ft. 8 in. long, has no openings into the carhouse, access being by a door on the areaway. It contains a 1000-gal.-per-minute motor-driven Underwriters' pump, two 6000-gal. capacity pressure tanks, controlling valves for the sprinkler systems of the three westerly sections of each level, automatic starting device for pump, priming tank and annunciator to indicate the location of an opened head. The floor of this and the two succeeding rooms is 12 ft. below the level of the main carhouse floor.

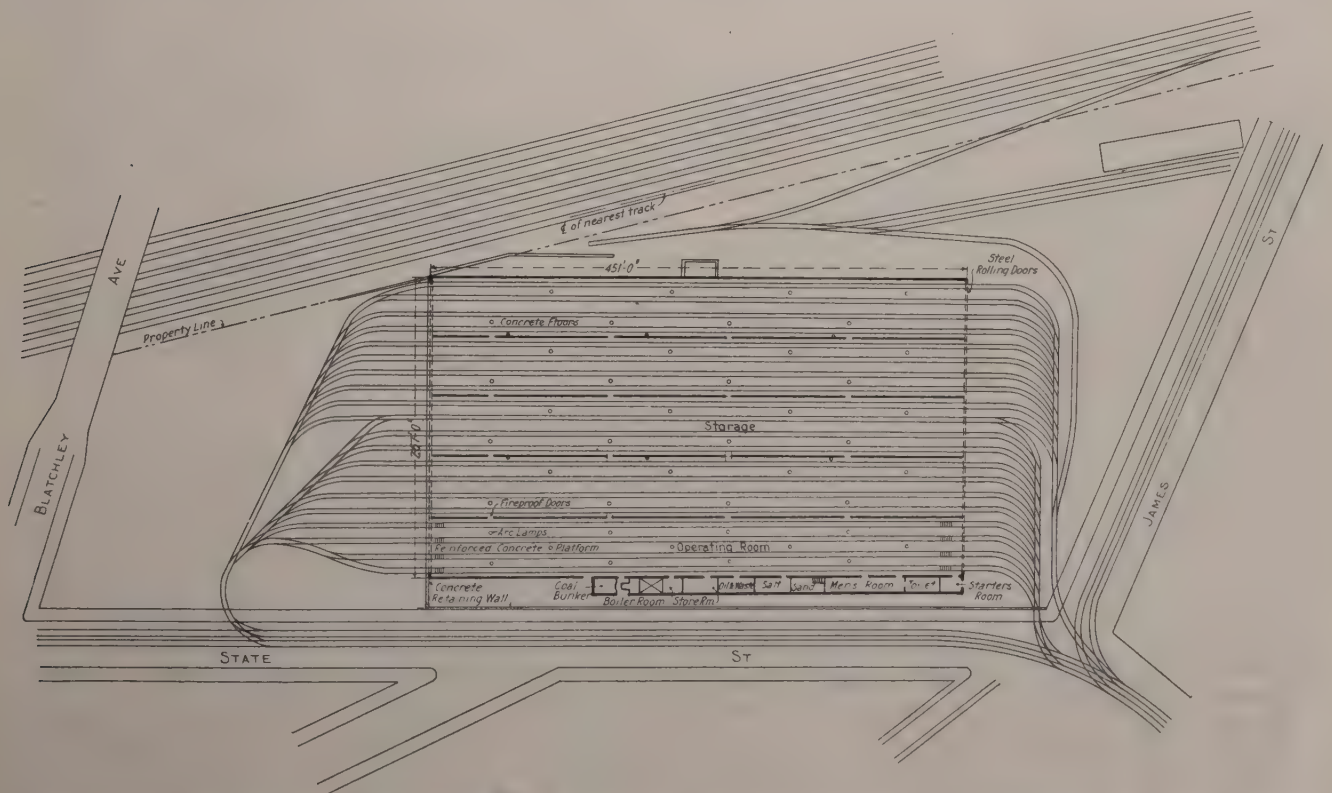
The fanroom, 29 ft. 4 in. long, contains a 15-hp d.c. motor belted to a Sturtevant 140-in. straight-vane blast wheel Vento radiator with 2420 sq. ft. heating surface and a 5¼-in. x 3½-in. x 5-in. duplex pump with a receiver for returning condensation to the boilers. The boiler room is 41 ft. 4 in. long, of which 21 ft. 4 in. is coal bunker. It contains two 50-hp vertical boilers, coal for which is delivered from the first track of the operating section through openings 7 ft. long x 3 ft. 4 in. high. These opening are closed by steel shutters.

The first low-level section of the carhouse proper is provided with full-length pits. A concrete floor 5 ft. below the main floor and continuous throughout the entire section forms the pit floor. This floor carries a series of brick piers, 12 in. square, spaced 10 ft. center to center, which in turn carry, on special cast-iron seats, the track rail of Lorain section No. 297. The platforms are reinforced concrete slabs, sprung between the rails, which latter are tied to line by ¾-in. x 1½-in. tie-rods, which are bedded in the platforms every 5 ft. In the remainder of the low-level sections the track is of Lorain section No. 267 laid on 8-ft. x 8-in. x 6-in. oak ties in cinder ballast. The concrete floor, which has a 4-in. base and a 1-in. wearing surface, is finished off level with the top of the rail.

The second floor consists of a series of 24-in. built-up plate girders carried on the main wall pilasters, steel columns built into the firewalls and concrete incased steel columns between the firewalls. The original intention was to build the low-level section first, and put the roof in approximately the position of the future second floor; then, when local conditions demanded the extra facilities, to jack up the roof and insert in each column an intermediate section with connections for the second-floor system. As later developments made it desirable to have available the upper level at a much earlier date than originally anticipated, the sections were shop-riveted and the columns were erected complete.

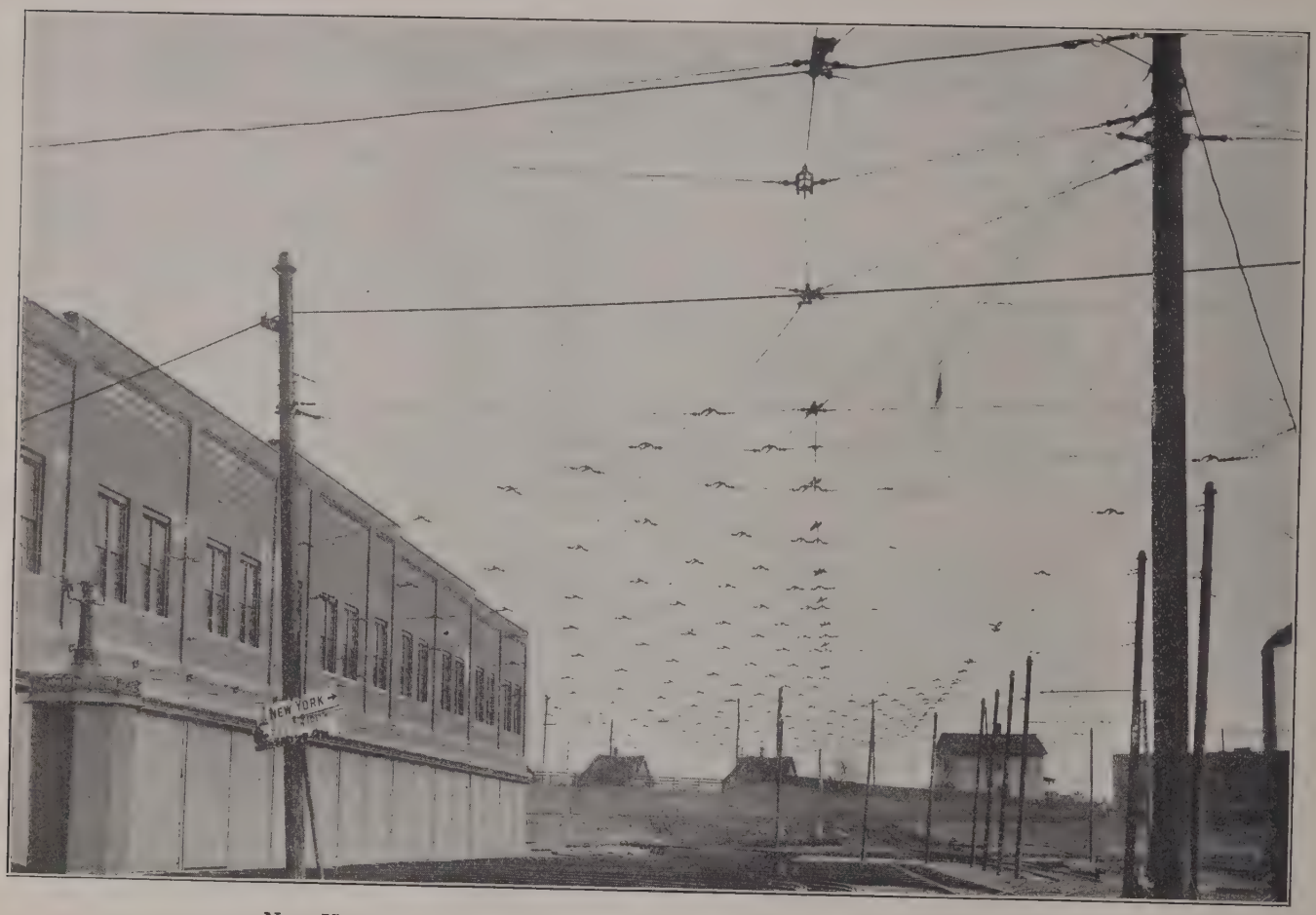


New Haven Carhouse—Cross-Section, Showing Construction of Roof, Walls, Floors and Pits

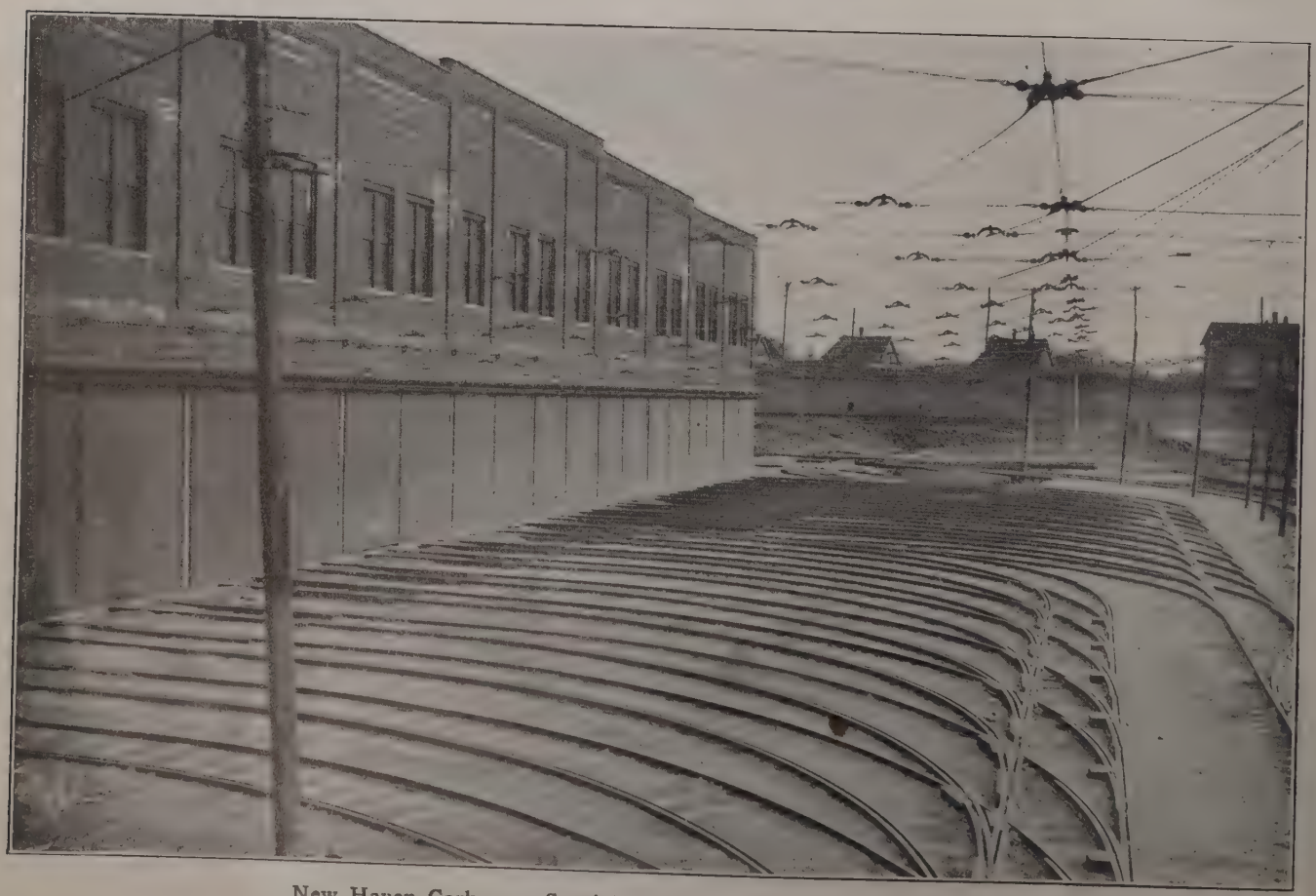


New Haven Carhouse—Floor Plan, Showing Storage and Operating Divisions, Utilities Rooms and Track Layouts

The upper-level rails, Lorain section No. 229, are carried



New Haven Carhouse—A Remarkable Example of Neat Overhead Work



New Haven Carhouse—Special Work Layout in Front of Building

on rail stringers framed into the cross girders, to which stringers they are held by hook bolts. Blocks of wood 2 in. x 2 in. x 2 in., spaced 3 ft. apart, were used to maintain between the rail and the stringer an interval which was

New Haven Carhouse—Bay on Second Floor

filled with concrete when the floor slab was poured. The latter, 4 in. thick at the center, is sprung between the rails to incase them completely except on the top of the head.

The columns are continued above the upper floor to carry the roof trusses, which also serve as cross stiffeners, and they are tied longitudinally by latticed girders 30 in. deep. The roof itself is a series of saw-tooth trusses carrying on channel purlins a 2½-in. Ferroinclave slab with five-ply tar and gravel cover and having Toncan metal cornice and fixed sash.

The track entrances are closed by Wilson rolling steel shutters 12 ft. wide with external casings, an arrangement necessitated by the scanty headroom. The operating chains, however, are inside with shafts through the wall and are connected by bevel gear drive to the rollers.

OVERHEAD CONSTRUCTION

The overhead construction outside the building is of necessity very heavy, especially on the lower level, where clearance requirements prevent the location of any poles in-

New Haven Carhouse—Toilet Room

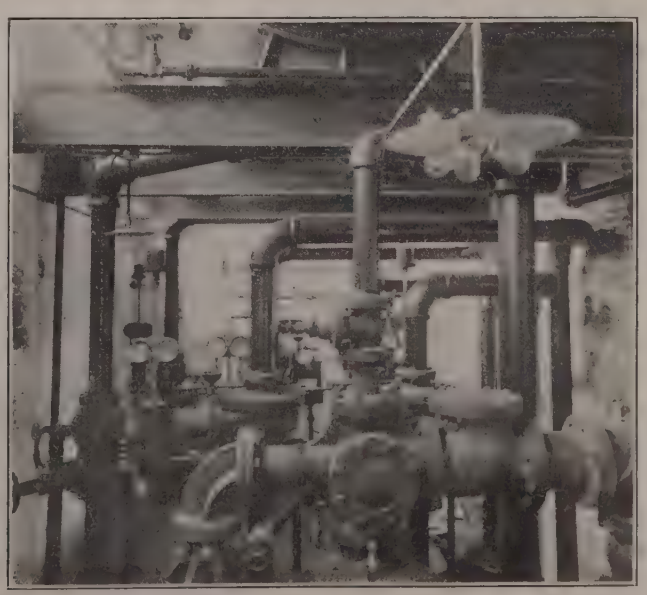
side the special work area. The wire used is No. 00 with Connecticut Company standard fittings. From the extra-heavy steel poles set in concrete, spans of an average length of 130 ft. are run to attachments on the face of the carhouse, with which they make an angle of 45 deg., while from bridles from pole to pole pull-offs are extended between and parallel to the main spans. On the lower level the spans are 18 ft. apart with two pull-offs between; on

New Haven Carhouse—Bay on First Floor, Showing Sprinklers

the upper level the spans average 100 ft. in length and are 25 ft. apart with one pull-off between. Both spans and pull-offs attach to all curves crossed, giving pulls ranging from radial to a maximum inclination of 45 deg. In addition to the spans and pulls, special independent anchors tie each curve at tangent points.

At the doors, the trolley wires attach to pans carried by a heavy strainboard in the hood, while similar pans on the inside connect with the carhouse contact. The latter is a 2½-in. x 2-in. x ¼-in. angle on a 12-in. x 2-in. backing board. This arrangement not only gives an excellent smooth running contact, but it also mechanically prevents an "off trolley" pole from touching the live conductor and short-circuiting on sprinkler pipes or other metal overhead. The lower edge of the doors is furnished with insulated guides which mechanically bridge between the pans. A series of insulating material in the latter prevents an arc to the door.

Power for the overhead wires, the lighting and the few



New Haven Carhouse—Pump Room

motors is supplied direct from the power station by a feeder which has no other load. The liberal use of circuit-breakers and sectionalizing devices reduces to a minimum the extent of interference in case of trouble.

U. OF I. LIBRARY

TRACK LAYOUT

The low level, which will be the more active operating section, has a double-track entry and ladder, ten tracks going from each branch, while crossovers at the entrance and between tracks Nos. 10 and 11 tie the groups together. The entrance and the first ten tracks, this including the operating section, are in hard center work; the remaining ten tracks are of built-up type. The upper level, which is purely for storage, has a single-track entrance from the double track in the street, and opens into two ladders, each having ten tracks and connected by a crossover between tracks Nos. 30 and 31. Only the entrance and the first switch, mate and frog are in hard center.

On the lower level a favorable angle in State Street permits a direct entrance to all tracks, in spite of the nearness of the building to the street center. On the upper level, even with a radius of 40 ft., it is necessary to reverse into tracks Nos. 21 and 22. Except, however, in the case of track No. 40, where the steam railroad right-of-way crowds over the entrance, there is on every track a tangent in front of the door of sufficient length to permit the largest car to be "straightened out" before entering. A hinged post between tracks Nos. 39 and 40 swings out of the way to give the necessary clearance on the latter track. On the lower level are two stub tracks with a wheel platform at the side of one, connected through a switchback with the steam railroad and through a branch-off from the second ladder with the street system.

The street work and the first ten tracks of the lower level were furnished by the Barbour-Stockwell Company, the second ten tracks of the lower level by William Wharton, Jr., & Company, and the tracks on the upper level by the Pennsylvania Steel Company.

LIGHTING AND HEATING

The lower level of the carhouse has windows on the side next the railroad, and on that portion of the State Street side behind the utilities section, but by far the largest part requires artificial light at all times. Advantage has been taken of this condition to make a comparison of various types of lighting under identical conditions. The operating section has Cooper Hewitt tubes, the next section 250-watt Mazda lamps with Wheeler reflectors, and the remaining three sections series arcs. The upper level is in 250-watt Mazdas with Wheeler reflectors. The pits are lighted by a series of incandescents under the platforms. All lighting is on the 550-volt trolley circuit. All control apparatus and protection for a given section is grouped in a separate cabinet at a convenient point. All wiring is in conduit.

The heating is by a blower system. Two 50-hp boilers supply steam to 2420 sq. ft. of Vento radiation, over which a motor-driven 140-in. straight-blade Sturtevant fan forces air through galvanized-iron ducts under the platforms to points of distribution. In the utility section stacks rise in the side walls to deliver air through wall registers; in the pits frequent gated outlets are located under the platforms. The system is designed for four complete air changes per hour and is guaranteed to maintain a temperature of 70 deg. Fahr. in the utilities section and 60 deg. Fahr. in the operating section, with a temperature of zero outside. Only these two sections are heated.

FIRE PROTECTION AND WATER SUPPLY

The protection against fire is very extensive. A series of standpipes, each with 50 ft. of 1½-in. hose, is so arranged as to control the entire area completely. The location of each standpipe is indicated by an incandescent lamp, which burns all the time. Clear white glass lamps are used instead of the conventional red because they would be more easily visible through smoke. In addition, there is a full installation of Grinnell automatic sprinklers of the ceiling type in the utilities section and of the aisle type at the level of the car transom in the carhouse proper. In all there are sixty-five ceiling heads and 3420 aisle heads.

In the heated sections it is possible to employ the wet-pipe system, but by far the greater portion is of necessity dry pipe. To cut down the length of water travel, control is established from two centers. The pumproom has the valves for the westerly three sections of each floor, while the remaining two easterly sections are operated from the valve house. The water supply and the main runs are carried across the building under the floor in a concrete conduit, to which large cover plates give access at many points.

New Haven Carhouse—View Along State Street, Showing Part of Entrance to Second Floor

Water is taken from the city mains. In case this pressure falls below 60 lb. per square inch, the 1000-gal. motor-driven pump is automatically cut in. Several 6000-gal. pressure tanks serve to bridge the brief interval in which the pump is coming up to speed. As a further protection, hose connections are provided by which a steamer can pump directly into the system.

A number of housed hydrants, equipped with hose, provide means for fighting an external blaze. These hydrants are on the carhouse side of the pump. By cutting off the carhouse sprinklers and blocking the 80-lb. maximum pressure limit the hydrants can be used as a powerful adjunct in fighting an exposure fire.

GENERAL

As a preliminary to construction, 70,000 cu. yd. of gravel were removed by steam shovel, the site having been by no means exhausted as a borrow pit. The end wall foundation was sloped. State Street and the railroad walls had to be sheeted, but the character of the material greatly simplified matters. No special construction plant was employed. Cement was delivered on a siding at the site. Gravel from the excavation was elevated on a centrally located tower, screened and fed to the mixer below, from which the concrete was taken partly by small cars and partly by concrete barrows. The 2000 tons of steel were erected from the second-floor level by two small travelers, the first setting the columns and just enough of the floor system to support them, the second following after and completing the erection. One hoister, centrally located,

operated both of the travelers of this system. The carhouse, which is described, was started Oct. 10, 1910; ten months later the operating section was put into service, and the lower level was practically complete Jan. 15, 1912. The upper level was finished April 1, 1912.

ENGINEERING

The design was by the engineering department of the New York, New Haven & Hartford Railroad, and the work was directed by its trolley construction department. The track and overhead work were installed by the Connecticut Company forces; the lighting by the bridge and building department of the steam railroad. All other work was done by the general contractor, C. W. Murdock, of New Haven, the Berlin Construction Company furnishing and erecting the steel under a sub-contract.

THE CENTRAL ELECTRIC TRAFFIC ASSOCIATION MAP

The Central Electric Traffic Association has just issued its revised map showing the electric railways in the territory covered by the association and all the steam-road connections. A reduced copy of this map is shown in the accompanying insert. For several reasons there has been a long-felt want for a uniform map of this kind. It is understood that the central territory is possessed of a larger aggregate mileage of electric railways than any other section of the United States. Certainly, there is no other section in the United States, or even in the world, where the development of through traffic, both passenger and freight, is advanced to so marked a degree as in this territory. There has been a demand for a complete electric railway map by the manufacturers, jobbers and shippers, and while all roads, large and small, have realized the importance of distributing a map, not all have felt justified in making the expenditure necessary to publish one themselves. However, the existence of the Central Electric Traffic Association has made it possible for all roads, being members of the association, to publish a uniform map, meeting in general all requirements of their patrons.

The committee having this work in charge for the Central Electric Traffic Association was appointed in the spring of 1910, and is composed of G. M. Patterson, traffic manager Toledo & Chicago Interurban Railway, Kendallville, Ind., chairman; J. H. Crall, general passenger and freight agent Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis; O. H. Murlin, general passenger and freight agent Dayton & Troy Electric Railway, Dayton, Ohio; C. C. Trees, auditor Kokomo, Marion & Western Traction Company, Kokomo, Ind., and W. S. Whitney, general passenger and freight agent Ohio Electric Railway, Springfield, Ohio.

Immediately upon its appointment the committee began to gather information from which to make its recommendations. These were duly made and changed from time to time to meet the requirements of individual lines. At the same time the committee, together with A. L. Neereamer, solicited the roads to participate in the proposition, until now the total number of companies parties to the map, is approximately forty-five, representing about 3500 miles of electric railway. Besides this, however, all roads operating in the association territory are shown on the map, member roads being shown in heavier lines than non-members. The plates, however, are so made that the lines for roads desiring to come in later can be changed to conform with the rest.

The size of the map is 17½ in. x 24½ in. At first it was planned to make the map 30 in. x 36 in., but later it was decided that the smaller size would more satisfactorily meet the general demand, it being of adequate size for wall purposes and not too large to be folded and carried by commercial travelers. In selecting the colors the committee endeavored to pick a combination that will attract but at the same time present a rich, neat appearance. The electric lines are shown in red and the steam roads in black. The map background is light buff with dark buff along the boundaries of states, lakes and rivers with the latter two colored in two shades of blue. Other important features are that this map shows all points covered by the tariffs issued by the Central Electric Traffic Association and is protected by copyright in the name of the association.

The advantages to be gained from the distribution of a map of this character are many. Generally speaking, it is conceded to be the best advertising medium employed by any railway, either steam or electric. Until very recent years the employment of electric railways for long-distance travel was not popular. Since this class of traffic has developed to its present stage the uniform map is and will be an important factor in the further development of through traffic. The map will be popular with manufacturers, who will use it to locate their agencies, hence furthering the interests of the interurban lines in general. It will be valuable to jobbers for practically the same reasons. Among the commercial travelers there is a demand for a map such as this one to be used by them in selecting their routes. It will be of unlimited value to agents in furnishing information to the inquiring public and in locating routes.

In compiling this map considerable time and labor were spent by the committee in collecting data from the various lines, in checking these data and in looking after the various other details, and it is its earnest hope that mutual good will result from its circulation to both the public and the electric railways participating. The contract for the manufacture of the plate, which is made by the wax process, was awarded to the Woodward & Tierman Printing Company of St. Louis, Mo., which also received the printing contract.

In securing the information and in order to make the map correct and reliable every interurban company participating in the district furnished the association with a blue print or tracing. This gave the exact location of each interurban line in the counties through which it ran and the location of the various towns situated upon the line. After these blue prints and tracings were combined with the maps furnished by the various railroad commissions a geographically correct map was obtained.

From the drawing thus prepared an engraving was made upon a wax plate and after the proof was checked from this wax plate the master plates were made. An opportunity was given to each interurban line to check the location of its stations on the line of its right-of-way. This, while it took considerable time, was well worth the effort.

The map will be ready for distribution on or before July 20 of this month, and when it is in the hands of the traveling public the shipper or the manufacturer will have a source of reliable information and will not be misled as he is at present by some of the maps on the market.

The map is fully and completely protected by copyright and each time a correction or alteration is made it will be protected by copyright. It is the intention to keep the map always up to date, and as new roads and extensions are built, new towns established or the names of old towns changed, corrections will be made so that the public may at all times have an accurate map.

In an article on the subject of the protective qualities of paint in the *Zeitschrift für Elektrochemie* for Feb. 1, 1912, and abstracted in the *A. S. M. E. Journal* it was stated that the commonly accepted belief that several coats of paint protect iron from rusting better than one coat is fallacious. The author's experiments with many kinds of paint have uniformly shown that the tendency of iron to rust was in direct proportion to the number of coats of paint which were applied. This phenomenon is believed to be due to electric action at the surface of the iron with the different coats of paint, the greater number of points of contact with different layers giving rise to a greater electrolytic action.

The Boston & Northern Half-Fare Case

Special Points of Interest in Connection with the Argument of the Company as Presented to the Supreme Court of Massachusetts

Reference was recently made in these columns to a decision of the Massachusetts Supreme Court to the effect that the half-fare statute (Chapter 567) enacted in that State in 1910 is constitutional. By the terms of this act, pupils of industrial day and evening schools are required to be transported at half-fare when traveling between their homes and the schools which they attend, and the companies are required to sell tickets for this purpose in lots of ten each. For alleged violation of this act the Boston & Northern Street Railway Company was made the defendant in a suit by the Commonwealth, and the State was sustained by the Supreme Court, the judgment rendered being in favor of one Barker, a pupil in the Lawrence Independent Industrial School. It is expected that the company will carry the case to the Supreme Court of the United States. In view of the great interest at present existing in relation to street railway fare problems, however, and the extreme thoroughness with which the company's brief was prepared, some of the more important points included in the latter are abstracted in the following paragraphs.

TABULATION SHOWING LOSSES SUSTAINED BY BOSTON & NORTHERN STREET RAILWAY ON ACCOUNT OF PARTIAL COMPLIANCE WITH HALF-FARE STATUTES.

	Years Ending Sept. 30—				Nine Months End'g June 30.
	1906.	1907.	1908.	1909.	1910.
Total number of passengers carried by defendant	87,313,774	91,158,418	92,044,330	94,524,399	68,038,502
Total operating expenses and fixed charges of defendant	$3,648,623	$3,904,136	$3,948,295	$4,098,793	$3,068,941
Average cost of carrying each passenger in terms of operating expenses and fixed charges	$0.0418	$0.0428	$0.0429	$0.0434	$0.0451
Number of half-fare tickets mentioned in Ch. 567, Acts 1910, and preceding Acts, sold by company	693,690	792,020	860,930	995,480	960,030
Price of each ticket	$0.025	$0.025	$0.025	$0.025	$0.025
Regular fare charged by defendant for ride procured by each such ticket	$0.05	$0.05	$0.05	$0.05	$0.05
Total revenue of defendant from sale of such tickets	$17,342.25	$19,800.50	$21,523.25	$24,887.00	$24,000.75
Total loss of revenue sustained from sale of such tickets	$17,342.25	$19,800.50	$21,523.25	$24,887.00	$24,000.75
Loss sustained by company on every pupil carried at half-fare as required by statute in terms of operating expenses and fixed charges	$0.0168	$0.0178	$0.0179	$0.0184	$0.0201
Total loss sustained by company from carrying pupils as above	$11,654	$14,098	$15,411	$18,317	$19,297
Total operating expenses of company plus taxes and rentals of lease lines	$3,091,586	$3,278,912	$3,284,091	$3,453,108	$2,592,415
Average cost of carrying each passenger in terms of operating expenses, taxes and rentals	$0.0354	$0.0360	$0.0357	$0.$365	$0.0381
Loss sustained on every pupil carried at half-fare in terms of above	$0.0104	$0.0110	$0.0107	$0.0115	$0.0131
Total loss sustained by company from carrying pupils as above	$7,214.38	$8,712.22	$9,211.95	$11,448.02	$12,576.39
Total operating expenses of defendant plus taxes	$3,005,926	$3,189,875	$3,197,858	$3,355,564	$2,519,026
Average cost of carrying each passenger in terms of operating expenses and taxes	$0.0344	$0.0350	$0.0347	$0.0355	$0.0370
Loss sustained on every pupil carried at half-fare in terms of above	$0.0094	$0.0100	$0.0097	$0.0105	$0.0120
Total loss sustained by company from carrying pupils as above	$6,520.69	$7,920.20	$8,351.02	$10,452.54	$11,520.36
Total operating expenses of company	$2,763,344	$2,925,320	$2,919,488	$3,059,730	$2,294,445
Average cost of carrying each passenger in terms of operating expenses	$0.0316	$0.0321	$0.0317	$0.0324	$0.0337
Loss sustained on every pupil carried at half-fare in terms of above	$0.0066	$0.0071	$0.0067	$0.0074	$0.0087
Total loss sustained by company from carrying pupils as above	$4,578.35	$5,623.34	$5,768.23	$7,366.55	$8,352.26

UNPROFITABLE CHARACTER OF SCHOOL TRAFFIC

The company's brief in the case was prepared by its counsel, Bentley W. Warren, C. R. Lamson and W. H. Stone, of Warren, Garfield, Whiteside & Lamson, of Boston, and is a printed document of forty pages on file with the Reporter of Decisions, Suffolk County Court House, Boston, Mass. It begins with an Agreed Statement of Facts, covering eleven points giving the circumstances of the case and establishing the identity of the railway company, the school in question, the ages and residences of its pupils, the fares in force, and the effect of carrying pupils at half-fare under existing statutes. This last information is summarized in the accompanying table, showing the losses sustained by the defendant by partial compliance with the half-fare statutes, which apply to pupils of public day and evening schools generally, including private schools of the same grade. In general, the table shows that the company underwent a substantial loss per pupil carried at half-fare, the loss increasing from year to year. The company contended that the cost of living, of labor and material and of operating its railway has greatly increased during the past five years; that its general rates of fare are lawful and reasonable; that the pupils in question ride on the cars at times of heavy traffic; that the average length of ride of such pupils is as great as the average length of ride of other passengers; that the securities of the company have been issued with the approval of the Massachusetts Railroad Commission under the provisions of the anti-stock-watering statutes, and that in order to make up to itself any substantial loss that it may incur in carrying the pupils of the school in question at one-half the regular fare it would be necessary for the company to increase, at least to some extent, the rates of fare charged by it. These contentions were admitted by the Commonwealth.

OTHER OBJECTIONS TO STATUTE

The remainder of the brief is occupied with arguments, citations and requests for rulings prepared on the general ground that the statute in question is unconstitutional. The company maintained that the statute seeks to appropriate the property of the defendant without reasonable compensation; that it impairs the obligation of contract, creates unjustifiable discrimination in favor of part of the traveling public, deprives the defendant of the right to conduct and manage its own affairs, and that it violates the fifth and fourteenth amendments to the Constitution of the United States.

The company also contended that the only offence created by the statute is its failure to sell tickets in accordance with the requirement or to such tickets when presented by a person entitled to use them. It contended that the statute impaired the obligation of contract formed by the charter granted the company by the State, and is therefore a violation of the fourteenth amendment of the United States Constitution; that under this statute the defendant is denied the equal protection of the laws, since the half-fare acts do not apply to the Boston Elevated Railway Company by terms of its charter. The brief points out that such an exemption is in the nature of an unwarranted discrimination. It was argued that day and evening schools of the industrial type are not public schools as defined by the court in Commonwealth vs. Connecticut Valley Street Railway. It contends that the rate above fixed by statute for the transportation of a particular class of persons is null and void since it not only does not yield to the defendant a reasonable excess over the cost of performing the service, but does not even return the actual cost of transporting such pupils. The above losses cannot be accounted for on any theory of extravagant management, and the figures tabulated show that the company conducts its business with

reasonable economy. The loss has been increasing year by year, and it is significant that in the nine months ending June 30, 1910, the loss exceeded that of the previous twelve months.

Equally noticeable has been the tendency of the Legislature to add from time further classes of pupils to those previously entitled to the benefits of the half-fare acts. The annual increase, however, in this defendant's loss, has resulted, not from carrying these additional classes at the half-rate prescribed, but only from compliance with the statute in its earlier form, when it included among its beneficiaries only pupils of public schools and of the equivalent private schools. (Schools of theology, law, medicine, dentistry, music, art, architecture and agriculture are not included among the private schools classed with public educational institutions subject to the benefits of the law.) The word pupils refers only to children and youth. The ages of the various pupils attending the Lawrence Independent Industrial School average fifteen in the daytime and twenty-five in the evening, and show that this school is an institution for adults. The classification attempted in this case is arbitrary. Any increase in the number of passengers to be carried by the company at one-half fare merely increases the loss to the company of carrying such passengers or increases the burden to be borne by other passengers of the defendant in the form of increased fares to make up such loss. The pupils are carried from 1 mile to 3 miles on rides for which the regular fare is 5 cents, and to a maximum of 8 miles for a ride where the defendant's regular fare is from 10 to 15 cents.

FINANCIAL STANDING OF COMPANY

Abundant evidence of the unsatisfactory financial conditions of the street railways of the State is found in the official reports of the Railroad Commissioners. The defendant, from 6 per cent in 1902, reduced its dividends to 5 per cent in 1903, 2.5 per cent in 1904, and 2 per cent in 1905. Since then it has paid 5 per cent in each year. The bonds of the company were not restored as a savings bank investment in Massachusetts until 1911. Six per cent is not an unreasonable return (Wilcox vs. Consolidated Gas Company, 212 U. S., 19, at 48 and 49).

REPORT OF RECEIVER WHITRIDGE

In connection with the final steps ending the receivership of the Third Avenue Railroad Company, F. W. Whitridge has made a report to Judge Lacombe of the United States Circuit Court. The report says in part:

"My attorneys have presented to you a petition for my discharge as receiver of the Third Avenue Railroad Company together with the final report of the master, Howard Taylor, in respect to that receivership, and they will be in position, within a few days, to present a similar petition in respect to the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway Company, and the Union Railway Company of New York City, together with reports of the masters.

"As to the Dry Dock, East Broadway & Battery Railroad Company, a contest still exists between a committee representing $1,100,000 of so-called certificates of indebtedness of that road, and the Third Avenue company, which owns $1,800,000 of the notes of the Dry Dock road. I supposed that an arrangement had been made for the settlement of that litigation, but it has fallen through, and it will probably be some months before the petition for my discharge can be presented in that receivership.

"Everything has, however, been settled excepting this one controversy, and everything has been done by me in respect to the Dry Dock road which, in my judgment, prudently can be done, and I think I may consider that, with the petitions above referred to, these receiverships are practically closed and that a general report as to my work may properly be presented to you at this time.

"I was appointed receiver of the Third Avenue road on Jan. 12, 1908, and of the other roads on March 31 in the same year. The general condition of all of those properties was as bad as it could have been, without suspending business. I have given nearly the whole of my time to the work during the four years in which I have had the custody of these properties, and reports made to the bondholders on May 9, 1908, and Jan. 1, 1911, show substantially the situation of the property and what has been done to it by me during that period of time.

"All of the buildings referred to in those reports have been put in thorough order. I have been unable to make any disposition of the Bayard Street property such as I hoped might have been made. All have been furnished with the very best fire protective apparatus and the cost of insurance has diminished from sixty odd thousand dollars a year to about thirty-eight thousand dollars a year, and the amount of property insured has materially increased.

"I have sold or broken up most of the cars turned over to me by the Metropolitan receivers and have purchased

THIRD AVENUE RAILROAD—AMOUNTS EXPENDED FOR NEW ROLLING STOCK, EQUIPMENT, IMPROVEMENTS AND ADDITIONS TO THE TRACK, BUILDINGS AND PROPERTY—FROM JAN. 12, 1908, TO DEC. 31, 1911.

New Rolling Stock and Equipment:		
Cost of 75 box cars, 50 open cars and 651 pay-as-you-enter cars	$2,816,307	
Sundry attachments with labor and material equipping above	633,126	
	$3,449,433	
Changing 248 cars to pay-as-you-enter, overhauling cars, etc.	371,218	
Converting horse cars into storage battery cars	5,276	
Automobiles, sweepers, derrick cars, emergency wagons, etc.	36,678	
	$3,862,605	
Less Sale of Cars: 75 to 42nd St., Man. & St. Nich. Ave. Ry.; 22 to Tarrytown, White Plains & Mamaroneck Ry., and 33 to other parties	482,460	$3,380,145
Sprinkling apparatus	$125,642	
Office building	131,939	
Car houses, sub-stations and other buildings with machinery and fixtures	360,269	
Purchase of property—129th Street and Third Avenue	63,630	
		681,480
Fort George Extension	$30,580	
New feeders and cables	25,544	
Track work, specials, etc.	114,890	
		171,014
Total		$4,232,639

seventy-five 28-ft. box cars, fifty 12-bench open cars, 150 28-ft. box cars of the pay-as-you-enter type and 479 convertible cars, a total of 754. I have entirely rebuilt 334 cars. I have also built or purchased eighty-five storage battery cars, which are used on the Dry Dock road and on the 110th Street line. These cars have proved economical and are agreeable to the public, and I am happy to say there is no longer a horse car on the Third Avenue System.

"I have put the track in workable order, but the recurrence of corrugations upon the new rails now being supplied caused me to delay completing this work until some remedy for this corrugation is discovered by the engineers or the manufacturers.

"After the decision of every point in controversy by the Court of Appeals in respect to franchise taxes, and after long negotiations with the city authorities, I paid all the franchise taxes due for the past ten years. After that was done, the State Board of Tax Commissioners continued to appraise the value of the franchises of the Third Avenue road at the same figures at which they were appraised at the beginning of the nine years' litigation, and I have been plunged into new litigation over the franchise taxes.

"The large claims made against the Metropolitan by me and by them against me, were finally compromised, and litigation which would certainly have lasted for years was thus averted. I received about $200,000 by virtue of this settlement.

"With your authority and the concurrence of the bondholders' committee, I established a benefit association, by

the terms of which the permanent force of the railroad's employees were invited to pay fifty cents a month to the association, which should supply a doctor and free medical advice. The money was to be used in case of illness, to pay a man after the second day $1.50 per day, and in the case of death $250 to his widow. The funds are invested by the Central Trust Company in securities in which trust funds may be invested under the laws of this State, and I stated that if 75 per cent of the men joined the association, the companies would contribute $1 for every dollar paid in by the men. This association has been a great success, over 80 per cent of the permanent force becoming members. It has now accumulated $48,156, which is mostly invested in New York City stock, it has given relief in 1381 cases, it has given over 5000 cases of free medical advice and has paid insurance upon the death of thirty employees. After a few years this insurance against death can be materially increased and a pension feature can be added. For the use of members of the association I have constructed at Sixty-fifth Street, 130th Street, West Farms and Corlears Street club rooms for their exclusive use. At each of those places and also at 129th Street and Amsterdam Avenue a lunch counter has been provided, and in connection with each of the club rooms a library has been installed by the New York free circulating library, together with a number of shower baths for the use of the men.

"Expenditures have been met from the net earnings of the railway and from the proceeds of the sale of receiver's certificates; $2,500,000 of these were finally paid by the reorganization committee.

"In respect to earnings I may say, when I took the property it was apparently earning about $1,000,000 a year. It is now earning net, after all proper deductions have been made, upwards of $2,000,000.

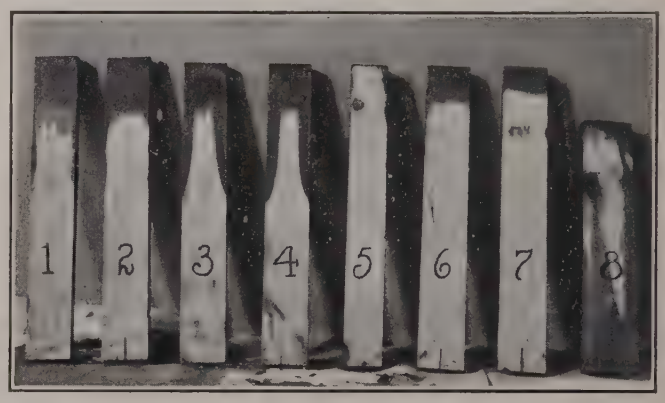
"In the conduct of my work I have been put to great expense and have been considerably delayed and hampered by the activities of the Public Service Commission. That body has been of no service to this property or to that portion of the public served by it, and it has burdened me with correspondence, orders and litigation which have attracted some attention. The commission has brought ten suits against me, one of which was of a really outrageous character, and in all of which they have been defeated. It should be mentioned that the commission has many times issued or authorized public statements from which it would appear that everything which has been done by myself or by the other officers of this court in respect to the surface railways of this city, has been done directly or indirectly by the Public Service Commission. This is a delusion I have not endeavored to combat, as it seems to be a matter for the alienists, but in respect to the correspondence, it should be mentioned that everything I have said is in the nature of a reply to some letter or order of this public body.

"I cannot conclude this summary of the work of this receivership without saying that whatever measure of success I have been able to achieve is due most largely to the zeal and intelligence of the members of my staff; in particular, Edward A. Maher, my general manager, and you must permit me also to express to you my warmest thanks for the support and encouragement I have received from you during the time I have been in charge of this property. My official relations with you have increased the admiration and reverence I was brought up to feel for the Judiciary, which has been justified and strengthened by my thirty odd years' experience at this bar, and for the personal associations which have come from those relations I can never cease to be grateful."

The Springfield (Ill.) Consolidated Railway has purchased two pulmotors to be used in restoring persons overcome by drowning, shock or gas. The instruments are not only for the employees of the city but are conveniently placed and will be loaned to any physician of the city.

TESTS OF ACID-RESISTING PAINTS BY THE THIRD AVENUE RAILWAY

The Third Avenue Railway, New York, is the largest operator of storage battery cars in the United States. Recently its car equipment department completed a test which was made to determine what kind of paint would offer most protection for battery crates or compartments and such parts of car woodwork as are subjected to the fumes of the battery gases. For this purpose eight pieces of white pine of similar grain were selected and each was coated with a different kind of paint. After these pieces had become dry they were immersed in dilute sulphuric acid of the same strength as used in this company's storage batteries. Following this immersion, the pieces were hung up to dry again. This alternation of dipping and drying was repeated at frequent intervals for seven months to imitate as closely as possible the conditions under which the woodwork of the battery compartment is used. Eight kinds of paint were applied, as shown in the following list and accompanying illustrations: No. 1, ordinary red lead; No. 2, brilliant black insulating; No. 3, ordinary white lead; No. 4, special finishing varnish; No. 5, Underwriters' insulating black enamel; No. 6, special battery box paint; No. 7, acid-resisting paint; No. 8, paint furnished by a storage battery company.



Samples of White Pine Treated with Paints of Supposed Acid-Resisting Qualities

The most remarkable feature of this trial was the discovery that No. 5, the Sherwin-Williams Company's insulating enamel, which is the Third Avenue Railway's standard for its electrical work, was by far the best material for the purpose mentioned, although no special claims had been made regarding its acid-resisting qualities. The piece treated with this varnish is indicated as No. 5 in the illustration previously noted. Strangely enough the worst result is shown by piece No. 8, which was treated with a paint used by a storage battery company to protect the compartments of its own batteries. It was noted from examination of several test pieces that the acid tended to penetrate for a considerable distance along the grain of the wood and that it permeated thin paint very readily.

One lesson drawn from the test was that to avoid trouble with battery compartments the wood should be of firm clear stock and be painted with at least three coats of thick, heavy insulating varnish. The treated wood should then be allowed to dry until the varnish is hard, so that it will not be scratched off from the wood in any place when the batteries are installed afterward.

Application has been made to the Amsterdam, Holland, municipal authorities for permission to construct three additional sections of electric tramway in that city. It is also proposed to take this opportunity of increasing the Amsterdam tramways rolling stock by the purchase of fifty new cars.

Niles Sub-Station of the Mahoning & Shenango Railway & Light Company

A Striking Feature is the Economy in Cost and Space Obtained Chiefly by Omitting Basement and Barrier Construction for the High-Tension Busbars.

At Niles, Ohio, the Mahoning & Shenango Railway & Light Company, which has its main offices at Youngstown, has installed a 2000-kw substation that is remarkable for economy in floor space and first cost when compared with the ordinary substation of equivalent capacity. It measures 27 ft. x 43 ft. inside of the walls, giving 0.58 sq. ft., or 83.5 sq. in. per kw of station capacity. The plans for the substation were developed by the engineering department of the company.

The economies in space and cost were effected largely through the omission of expensive basement and barrier work for the high-tension busbars which usually is included in a substation's equipment. Experience has shown that the omission of these features has not decreased continuity of service. As hereinafter described, bare-copper trolley wire is used for the high-tension busbars. They are supported on the ceiling, where they can be reached if necessary but at the same time are entirely out of the operator's way and hence perfectly safe. A very compact arrangement of equipment has been adopted to render all of the apparatus accessible to the hand of the operator, but at the same time the station is not at all crowded and is very well lighted by windows so located that apparatus does not obstruct the light. The general arrangement of the station enables the operator to see all apparatus from almost any part of the room. This is far more satisfactory than one where the operator has a part of the apparatus behind him while he is watching another part. Although designed to accommodate an ultimate capacity of 2000 kw, the station now contains the following apparatus, all of Westinghouse manufacture:

Two 500-kw, 600-volt, six-phase, 60-cycle, 900 r.p.m., self-starting rotary converters.

Three 550-kva, 22,000 volts to converter voltage, three-phase, 60-cycle, oil-insulated, self-cooling transformers diametrically connected for six-phase converters.

One six-panel black marine slate switchboard containing only such apparatus as is essential for the intelligent and efficient operation of the substation.

One 22,000-volt, three-phase, delta type "A" lightning arrester.
Six 900 lamp, 22,000-volt, type "7" choke coils.
Six 22,000-volt, 100-amp, type "M" disconnecting switches.

The substation building is of hardburned brick with a flat reinforced concrete roof, supported on steel I-beams, and a concrete floor, To the right of the substation is the carhouse and to the right of the carhouse is a freight station. All of these buildings are of the same general

Mahoning & Shenango Substation—High-Tension Tower

design and harmonize in appearance. All of the window panies are of wire glass. The walls inside of the operating room are painted black from the floor to a height of about 6 ft. Above this they are of a light color which effectively reflects the light and provides an excellent diffused illumination.

A substantial steel frame, supported on the steel roof members and cemented into the roof, forms the termination structure for the incoming 22,000-volt high-tension lines. The arrester horn-gap support of iron pipe is mounted at the rear of the termination structure. From the horn-gaps

Mahoning & Shenango Substation—Combined Substation, Carhouse and Freight Rooms at Niles, Ohio

The average and maximum loads on the station are 500 kw and 1500 kw respectively, and the design is such that it will care for the probable traffic for ten years.

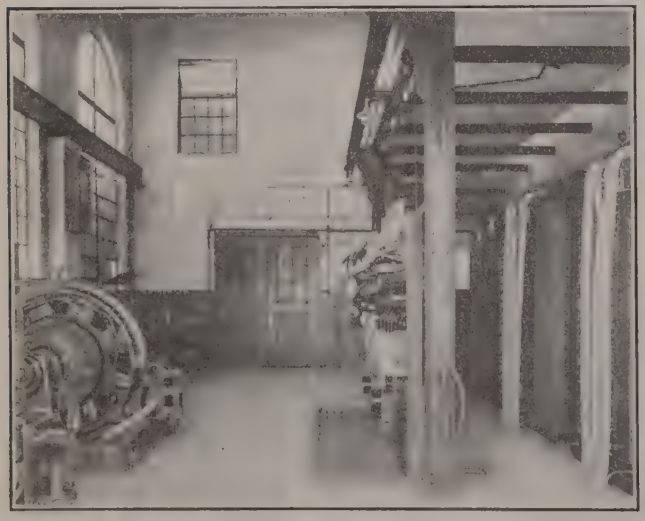
leads are carried through roof bushings to the electrolytic arresters, which are installed in a gallery in the room below. The change-over switch is located just ahead of

the arrester. The high-tension wires enter the building through plate-glass windows which are protected by reinforced concrete hoods.

The course of the current through the substation is so laid out that there is no "back-tracking" of circuits. That is, the apparatus is arranged on the circuits in logical order and the conductors connecting the members take the most direct routes and always go forward. This eliminates unnecessary conductors and economizes space. The current from the high-tension busbars is carried to the tops of the disconnecting switches. From the disconnecting switches it passes successively through the choke coils, the high-tension hand-operated circuit breakers and into the three-phase transformers. Low-tension current from the transformers is led to the a. c. switchboard panels, from which it passes into the rotary converters and there is converted into direct current. From the rotaries the direct current is carried to the d. c. rotary converter panel; from this panel it passes to the d. c. busbars, thence to the d. c. circuit breakers, past the low-tension lightning arresters and through the d. c. feeders to the trolley line.

Within the building the high-tension leads connect to the high-tension busbars, which are carried on the under face of the station roof above the high-tension gallery. The high-tension busbars consist merely of standard round No. 000 trolley wires supported by standard trolley hangers, which are in turn carried by porcelain insulators held by the roof I-beams. The high-tension bus structure is anchored at one end of the room. While they are entirely out of reach, the buses are bare, while at any point where an operator might come in contact with them they are fully insulated, with varnished cambric and flame-proof braid.

One of the accompanying views shows the arrangement of the choke coils and high-tension, hand-operated circuit breakers. All are mounted on a frame built of standard gas-pipe fittings. Each choke coil is supported by a single projecting arm from the pipe framework. The methods of mounting the disconnecting switches and series trans-

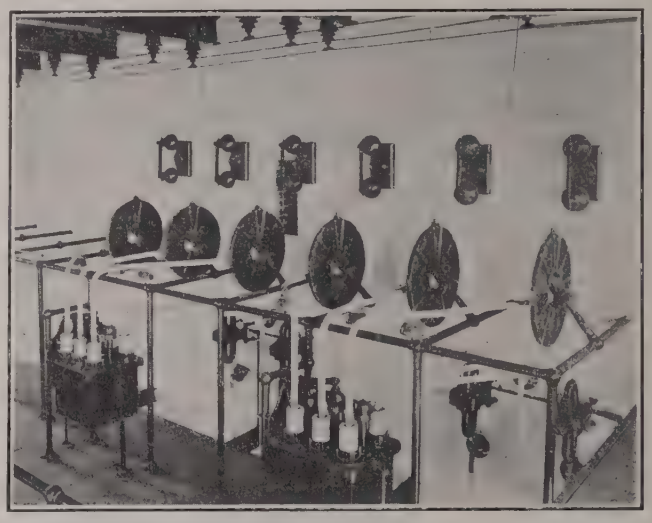


Mahoning & Shenango Substation—Rotary Converter, Switchboard, Transformers, etc.

formers are also shown in this illustration. The leads from the series transformers to the switchboard instruments are carried through wrought-iron conduit, fitted with condulets cleated to the wall. The three three-phase transformers are installed under the high-tension gallery. The leads from the high-tension circuit breakers make direct and short runs to the transformers, which are located just below the circuit breakers. There is ample passage between the transformers and the switchboard, which is located directly in front of them.

Each a. c. rotary converter panel has an ammeter, a power factor meter, a watt-hour meter, a circuit-breaker control mechanism, and other switching and synchronizing equipment.

The extreme left of the switchboard carries a Lincoln synchronizer on a swinging bracket and three voltmeters. The d. c. converter panels have voltmeters, ammeters, d. c. circuit breakers, a positive switch and a starting



Mahoning & Shenango Substation—High-tension Gallery with Busbars, Disconnecting Switches, Choke Coils, etc.

switch. One very interesting feature of the converter panels is the fact that each has the field break-up switch mounted on its sub-base instead of on the converter frame, which is the usual practice, so that the operator can start the converter without leaving the switchboard. Each of the two feeder panels is equipped with an ammeter, a circuit breaker and a switch. There are four feeder circuits.

The remote-control field rheostats, which are of the sprocket-operated type, are located in the pit beneath the switchboard. The circuit breakers are interconnected so that when the a. c. breaker opens the tripping coil of the d. c. breaker is actuated and the d. c. circuit is opened. The negative and equalizer cables are not carried to the switchboard from each converter, but are carried from one to the other in a pit under the machines. A substantial saving in cable resulted from this lay-out, and the saving would be larger in a station of the ordinary design.

The operation of the substation is facilitated by the provision of certain accessories and by features incorporated in the construction of the building. Thus a wooden grating is placed in front of the switchboard for the protection of the operator, because the switchboard frame is not grounded. A similar wooden grating covers the pit through which the cables pass, under and back of the switchboard. The pit can be entered by raising the grating. An air valve with connecting hose is located at the end of the switchboard for the application of a compressed-air jet to keep the apparatus free from dust and dirt. All of the pits under the converters and switchboard are connected by cable-ways, so that cables can be readily drawn between them or be taken out if necessary.

The Swedish State Railways has drawn up a plan for the electrification of the local traffic on the Stockholm-Marsta line and the Gothenburg-Alingas Railway. It is proposed to take the current for the latter from the State power station at Trollhättan, the three-phase current to be transformed to one-phase current of a convenient voltage. The energy for the Stockholm-Märsta line it is proposed to obtain from the city of Stockholm's central station at Värtan.

ASSIGNMENTS AT CHICAGO

H. G. McConnaughy, secretary and treasurer of the American Electric Railway Manufacturers' Association and chairman of the committee on exhibits, has announced the names of the manufacturers which had applied for space up to July 11 for the Chicago convention next October and the number of square feet assigned to each. This list is published below. As shown, it is divided into two parts, those which will have exhibits in the body of the hall and those which will have track space. As regards the latter, the committee expects to be able to announce shortly a still larger assignment, and it has received one application, not shown in the list below, for space for a complete train of cars. The decoration scheme arranged is unusual and as a whole the exhibits promise to surpass in number and interest any heretofore shown at a railway convention.

	Number of Square Feet Assigned.
Allis-Chalmers Co., Milwaukee, Wis	500
American Brake Co., St. Louis, Mo	144
American Brake Shoe & Foundry Co., Mahwah, N. J	304
American Bitummatic Enamel Co., Philadelphia, Pa	195
American Car & Foundry Co., St. Louis, Mo	950
American Engineering Co., Philadelphia, Pa	390
American Mason Safety Tread Co., Boston, Mass	120
American Steel & Wire Co., Chicago, Ill	858
Anderson Brake Adjuster Co., Omaha, Neb	195
Anderson Manufacturing Co., A. & J. M., Boston	240
Archbold-Brady Co., Syracuse, N. Y	120
Atlas Railway Supply Co., Chicago, Ill	156
Automatic Signal & Appliance Co., Cleveland, O	190
Automatic Ventilator Co., New York	195
Baldwin Locomotive Works, Philadelphia, Pa	608
Bayonet Trolley Harp Co., Springfield, Ohio	195
Berry Brothers, Ltd., Detroit, Mich	250
Boss Nut Co., Chicago, Ill	234
Brill Co., The J. G., Philadelphia, Pa	1,754
Buda Co., The, Chicago, Ill	858
Cambria Steel Co., Johnstown, Pa	450
Carnegie Steel Co., Pittsburgh, Pa	1,287
Chapman Valve Manufacturing Co., Indian Orchard, Mass.	195
Chicago Pneumatic Tool Co., Chicago, Ill	585
Chicago Railway Equipment Co., Chicago, Ill	240
Chicago Varnish Co., Chicago, Ill	267
Cleveland Frog & Crossing Co., Cleveland, Ohio	1,287
Columbia Nut & Bolt Co., Bridgeport, Conn	120
Consolidated Car Fender Co., Providence, R. I	380
Consolidated Car-Heating Co., New York	960
Corliss Carbon Co., Bradford, Pa	195
Crouse-Hinds Co., Syracuse, N. Y	570
Curtain Supply Co., Chicago, Ill	500
Dayton Fare Recorder Co., Dayton, Ohio	500
Dearborn Drug & Chemical Works, Chicago, Ill	1,190
Drouvé Co., The G., Bridgeport, Conn	234
Duff Manufacturing Co., Pittsburgh, Pa	304
Duplex Metals Co., Chester, Pa	190
Edwards Co., The O. M., Syracuse, N. Y	250
Electric Railway Equipment Co., Cincinnati, Ohio	190
Electric Railway Improvement Co., Cleveland, Ohio	468
ELECTRIC RAILWAY JOURNAL, New York	1,435
Electric Service Supplies Co., Philadelphia, Pa	1,548
Electric Traction Monthly, Chicago, Ill	250
Electric Traction Supply Co., St. Louis, Mo	168
Eureka Co., North East, Pa	195
Falk Co., The, Milwaukee, Wis	390
Flood & Conklin Co., Newark, N. J	250
Forged Steel Wheel Co., Pittsburgh, Pa	195
Forsyth Brothers Co., Chicago, Ill	500
Galena Signal Oil Co., Franklin, Pa	1,190
General Electric Co., Schenectady, N. Y	2,520
General Railway Signal Co., Rochester, N. Y	760
Gilbert & Barker Manufacturing Co., Springfield, Mass.	380
Globe Ticket Co., Philadelphia, Pa	204
Gold Car Heating & Lighting Co., New York	225
Goldschmidt Thermit Co., New York	858
Green Engineering Co., Chicago, Ill	190
Griffin Wheel Co., Chicago, Ill	330
Hale & Kilburn Co., Philadelphia, Pa	560
Hartshorn Co., Stewart, Newark, N. J	168
Hess-Bright Manufacturing Co., Philadelphia, Pa	195
Heywood Brothers & Wakefield Co., Wakefield, Mass.	250
Holland Trolley Supply Co., Cleveland, Ohio	304
Home Rubber Co., Trenton, N. J	168
Hunter Illuminated Car Sign Co., New York	180
Indianapolis Brass Co., Indianapolis, Ind	240
International Register Co., The, Chicago, Ill	570
Jeandron, W. J., New York	225
Johns-Manville Co., H. W., New York	500
Johnson Coin Counting Machine Co., New York	380
Jones & Laughlin Steel Co., Pittsburgh, Pa	500
Keystone Lubricating Co., Philadelphia, Pa	156
Lorain Steel Co., Johnstown, Pa	1,353
McCabe, J. J., New York	600
McCord Manufacturing Co., Chicago, Ill	234
McQuay Norris Manufacturing Co., St. Louis, Mo	156
Mica Insulator Co., New York	195
Midvale Steel Co., Philadelphia, Pa	450
Myers Safety Guard Co., Omaha, Neb	190
Nachod Signal Co., Philadelphia, Pa	190
National Brake Co., Buffalo, N. Y	390
National Brake & Electric Co., Milwaukee, Wis	1,254
National Carbon Co., Cleveland, Ohio	250
National Lead Co., New York	180
National Lock Washer Co., Newark, N. J	250
National Surety Co., New York	120
National Tube Co., Pittsburgh, Pa	435
Newman Clock Co., Chicago, Ill	225
Nuttall Co., R. D., Pittsburgh, Pa	408
Ohio Brass Co., Mansfield, Ohio	1,119
Ohmer Fare Register Co., Dayton, Ohio	570
Okonite Co., New York	156
Pantasote Co., New York	570
Pellissier Engineering Co., New York	322
Pennsylvania Steel Co., Steelton, Pa	1,782
Prepayment Car Sales Co., New York	380
Public Service, Chicago, Ill	435
Pyrene Mfg. Co., New York	225
Rail Joint Co., New York	195
Railway Improvement Co., New York	380
Railway Roller Bearing Co., Syracuse, N. Y	405
Railway Track-Work Co., Philadelphia, Pa	234
Rand-McNally & Co., Chicago, Ill	250
Recording Register & Fare Box Co., New Haven Ct.	156
Roebling Sons & Co., J. A., Trenton, N. J	380
Root Spring Scraper Co., Kalamazoo, Mich	195
Rooke Automatic Register Co., Providence, R. I	168

	Number of Square Feet Assigned.
Schutte & Koerting Co., Philadelphia, Pa.	195
Sherwin-Williams Co., Cleveland, Ohio.	600
Simmons-Boardman Publishing Co., New York City.	500
Smith Heater Co., Peter, Detroit, Mich.	304
Speer Carbon Co., St. Marys, Pa.	156
St. Louis Car Co., St. Louis, Mo.	190
St. Louis Steel Foundry, St. Louis, Mo.	608
Standard Coupler Co., New York.	304
Standard Motor Truck Co., Pittsburgh, Pa.	990
Standard Paint Co., New York.	190
Standard Roller Bearing Co., Philadelphia, Pa.	195
Standard Steel Works Co., Philadelphia, Pa.	585
Standard Underground Cable Co., Pittsburgh, Pa.	322
Star Brass Works, Kalamazoo, Mich.	156
Sterling Varnish Co., Pittsburgh, Pa.	190
Symington Co., T. H., Baltimore, Md.	304
Taylor Electric Truck Co., Troy, N. Y.	585
Templeton-Kenly & Co., Chicago, Ill.	234
Tool Steel Gear & Pinion Co., Cincinnati, Ohio.	250
Transportation Utilities Co., New York.	240
Trolley Supply Co., Canton, Ohio.	234
Union Switch & Signal Co., Swissvale, Pa.	1330
Universal Lubricating Co., Cleveland, Ohio.	204
U. S. Metal & Manufacturing Co., New York.	250
Valentine & Co., Chicago, Ill.	234
Van Dorn Co., Chicago, Ill.	304
Vixen Tool Co., Philadelphia, Pa.	304
Wallace Supply Co., Chicago, Ill.	190
Waclark Wire Co., Elizabeth, N. J.	288
Western Automatic Fender Co., Seattle, Wash.	234
Western Electric Co., New York.	760
Westinghouse Companies, Pittsburgh, Pa.	2,800
Wharton, Jr., & Co., Wm., Philadelphia, Pa.	990
Wheel Truing Brake Shoe Co., Detroit, Mich.	195
Whitmore Manufacturing Co., Cleveland, Ohio.	597
Whittier Mills Co., Chattahooche, Ga.	195
Wood Co., C. N., Boston, Mass.	190
Yale & Towne Manufacturing Co., New York.	234

TRACK EXHIBIT

	Running Feet Assigned.
McGuireCummings Mfg. Co., Chicago, Ill.	100
Near-Side Car Co., Buffalo, N. Y.	85
Niles Car & Mfg. Co., Cleveland, Ohio.	100
Prepayment Car Sales Co., New York.	60
St. Louis Car Co., St. Louis, Mo.	50

DISCUSSION ON MOTIVE POWERS ABROAD

The *London Times* Engineering Supplement has been made the arena recently for an old-fashioned tournament between the advocates of the direct-current and single-phase systems for railway electrification. Among those contributing letters have been W. S. Murray, electrical engineer New York, New Haven & Hartford Railroad, and H. Alexander, of Berlin, who have upheld the merits of the single-phase system, and H. F. Parshall and John B. Sparks, of London, who have taken the opposite position. Mr. Murray gives some figures on the comparative efficiency of the direct-current and single-phase systems, similar to those given by him in his recent Institute paper, and concludes with the statement that the company's track electrification in 1913 will be 552 miles, that the estimated cost of the system will be between 75 per cent and 80 per cent of that required for direct-current electrification, and that the all-day efficiency is 15 per cent higher. He says that $15,000,000 will be invested in this electrification. Mr. Parshall and Mr. Sparks believe the published results of the New Haven system are too meagre to allow anyone to draw a favorable opinion from them.

MEETING OF THE JOINT COMMITTEE ON JOINT USE OF POLES

A meeting of the joint committee on the joint use of poles was held at the headquarters of the American Electric Railway Association, 29 West Thirty-ninth Street, New York City, on Wednesday and Thursday, July 10 and 11, 1912. There were present: W. J. Harvie, chairman; A. S. Richey, C. L. Henry, W. S. Twining, Farley Osgood, W. T. Oviatt, Percy H. Thomas, F. B. H. Paine, J. J. Carty, F. L. Rhodes and H. S. Warren. These gentlemen represented the American Electric Railway Association, the National Electric Light Association, the American Institute of Electrical Engineers and the American Telephone and Telegraph Company.

The subject of the joint use of poles was informally discussed from various view points, and as this was its first meeting the method of handling the work by the committee was given considerable attention. Several meetings will probably be necessary in order to perfect the plans in view. The next meeting will likely be called in about three weeks.

DEPRECIATION ON ELECTRIC LIGHT AND POWER PLANTS

An inquiry in the National Electric Light Association Bulletin for June, 1912, relates to the percentages of depreciation on different elements of the physical property of an electric lighting and power system. This inquiry is answered by T. J. Walsh, Commonwealth Edison Company, of Chicago, who says:

"It is believed that the following rates of depreciation should take care of the actual depreciation in electric light and power properties, especially when it is considered that money set aside at these rates and invested in 4, 5 or 6 per cent securities or money put back into the business and thus earning a 4, 5 or 6 per cent return very materially increases the amount of the depreciation fund available by the time the property in question must be replaced: 3 per cent on power-house and substation buildings, 6 per cent on apparatus of all kinds, 4 per cent on underground cable, 2 per cent on conduit, 6 per cent on overhead distribution lines and 3 per cent on steel tower and bare copper transmission lines. Regarding depreciation on high-tension transmission lines, this latter transmission line figure of 3 per cent is probably enough, having in mind an additional 1 per cent for maintenance.

"Charges made to construction which do not represent tangible assets, such as organization expense, interest during construction, etc., should form part of the investment as long as the investment remains intact; that is, they should be written off with the buildings, apparatus or other investment, the cost of which they form a part."

In connection with an item published in the Electric Railway Journal for Jan. 27, 1912, it is learned that the London General Omnibus Company, London, England, has already placed in service an experimental pay-as-you-enter omnibus, which is to be the forerunner of some 3300 similar vehicles. These omnibuses will be converted under the European prepayment patents of the Pay-As-You-Enter Car Corporation which are controlled by the International P-A-Y-E Tram-Car Company, Ltd., of London and Paris.

TALKS WITH SCHOOL CHILDREN ON PREVENTION OF ACCIDENTS

H. K. Bennett, claim agent Fitchburg & Leominister Street Railway and president American Electric Railway Claim Agents' Association, has actively taken up the matter of discussing the question of prevention of accidents to school children, as has been done on the Pacific Coast and elsewhere in this country. The following is an abstract of a recent address which Mr. Bennett made before the High School scholars at Fitchburg, June 3.

"At this particular time of the year, when our thoughts have rightfully turned to other days when men freely gave their lives that we might all enjoy the full blessing of a free and united country, it seems not inappropriate that we should for a moment pause and give a little attention to the living, in the attempt to conserve life and limb. To some of you it may seem a purely selfish motive for a railway man to advise with you upon such a subject, but I assure you that could you see, as I do from day to day, the results of thoughtlessness and carelessness which lead to pain and suffering, I am sure you will forget the commercial thought and weigh carefully what I may say to you.

"It is but a short two years ago that a claim agent of a Pacific Coast city had an inspiration to start a campaign of 'First Aid to the Uninjured.' The idea was such a success in his own city that he, with others, carried the campaign from Los Angeles to Vancouver, with the known result that accidents were diminished to an astonishing degree. This campaign was carried out through the schools of those coast cities, and hundreds of thousands of school pupils enrolled themselves voluntarily in this humanitarian movement. Thus was founded the American Safety League—without salaried officers—simply a spontaneous movement for the sake of human safety.

"In January of this year, the Public Service Company of New Jersey, which controls practically all the electric railway and lighting companies of that State, brought from the West a man who is giving his whole time to the work and has been speaking three times a day in the public schools of that State, from the primary room to the high school pupils. Now the work there has gained the plaudits of all school instructors and boards of education, and with it all has come a lessening of human suffering.

"I was recently appointed the sole representative of the American Safety League in New England, and I am proud to say that this high school, which was my school more than twenty years ago, is the first school in these states to have a Safety Talk, and with your permission you are to be enrolled as the first members of the New England Safety League, an honor which, in days to come, I am sure you will fully appreciate. It was my intention to give you the regular Safety League lecture, but it was thought advisable to outline to you now at the close of your school year the ideas of the association, together with a few facts and figures which you will readily comprehend as the basic reason for safety talks.

"It is not because you, or the young men and women and the boys and girls that make up the public schools of this or other cities, are wilfully careless that you need reminders against danger, but rather to instill in your minds the necessity for thoughtfulness at all times, and so inoculate you with the virus of 'Prevention of Accident' that you will each become a missionary in the field and carry the thoughts to your parents and others, who perhaps may at some time or other be inclined to take a chance, but with your thoughtfulness save themselves from pain and suffering. In accidents here and elsewhere it is found that there are really but three reasons given by injured persons when accident overtakes them, and these reasons are:

"'I did not stop to think.'

"'I saw some one older than myself do what I did and thought it was all right for me to do it.'

"'I have done the same thing a hundred times before and never got hurt.'

"So it seems a necessity to ask you to 'think' not to follow some one else example, and not to take a chance.

"All accidents are not street railway accidents; we have the steam cars, automobiles, other traffic vehicles, all of which have their mission and their place, and under some circumstances, are more deadly than the enemy's bullet. Statistics show us that 95 per cent of all accidents are preventable.

"We live in the wonderful time when steam and electricity and a myriad of lightning-like servants have transformed society and changed the face of the world. We live in the danger day when more people are killed and maimed needlessly by automobiles, street cars, steam cars, live wires and other man-made agencies, than by anything known in the past, outside of great wars and plagues.

"A third and the most promising condition is that we live in the dawn of a new age when men everywhere are thinking about the 'other fellow' and working to help him find his world of safety and opportunity—when by many doing little things collectively great changes for good are replacing an age of individual effort and selfishness.

"The United States census stated that 95,864 persons lost their lives and 813,615 were wounded by our American railways alone in a period of ten years. During the entire Civil War there were but 67,058 Union soldiers killed on the battlefields. This goes to show that the six years of boasted peace have been as deadly as four years of rebel bullets—and from one source of accidents alone. Few passengers were killed. The list is made up of trespassers and employees. Casualties came to persons who walked on the track or tried to board or leave moving trains. These figures belong to the general problem that makes a science of safety one of the essential needs of the danger time.

"Special emphasis should be given to the dangers on and near all railway tracks; the dangers of the street, such as playing games where street cars and automobiles run; the jumping off and on of moving cars and wagons; the dangers of fires and live wires; the riding on steps of cars or the rear fenders; leaning out of car windows and many of these little things of every day life which are dangerous. I regret to say that I have photographs of high school pupils riding on front and rear steps of cars; on the blind side or the side next to the other track, seemingly delighted to take a chance of getting severely injured.

"So I am going to ask your co-operation in the carrying out of a few "don'ts," none of which is unreasonable, and they are suggested with the sole purpose of preventing you in a moment of thoughtlessness from doing something which will cause you physical pain and suffering and prevent you if possible from going through life maimed or crippled all for the want of thought.

"Don't ride on the steps, fenders or the blind side of a street car; don't touch a wire that is seemingly harmless, but which may be crossed with another wire and very much alive to your everlasting regret, if you should be fortunate enough not to be instantly killed; don't run in front of a car, automobile or team; don't play ball in the street or any other game where conveyances of these kinds are operated; don't hang your head or arm out of a car window; don't cross behind a car, auto or train unless you know there is nothing approaching on the other side; don't ride your bicycle in the street tracks or too close to them; don't get off a car backward; always face to the front in the direction the car is moving, have your left hand free to take hold of the grab handle, and if you have parcels, carry them in your right hand. Why a woman should always carry her mesh bag, umbrella, or bundle in her left hand is an unsolved mystery, and I may add with propriety, why can't you pick up your dress skirt as well with your right hand as your left?

"With these few thoughts, I hope to start you in the right direction."

THE BOSTON STRIKE

The strike situation on the lines of the Boston Elevated Railway Company has shown little change during the past week. The service rendered by the company has been well maintained, despite frequent night attacks on cars in districts occupied by the rougher element of the population. Except for the considerable number of new men at work on the cars, practically no sign of the strike is visible to the overwhelming majority of patrons of the company, and little disposition is observed on the part of the general public to avoid traveling on the surface, elevated or underground lines of the company. The enforcement of law and order has been vigorously pushed as in preceding weeks. The Grand Jury has indicted one Hutchinson on counts bearing upon the placing of dynamite on the company's tracks and has other indictments in prospect. A large part of the trouble occurring during the evening and night hours has been the immediate outcome of mass meetings of strikers at which violence by former employees has been fomented. In all cases mobs have been handled without gloves by the police and the list of convictions and jail sentences for disturbances of the peace and attacks on company employees and property is growing steadily. Numerous petty thefts have accompanied the acts of turbulent strikers.

An attempt was made early in the week to draw the Boston Central Labor Union into the strike situation, with the object of causing a walkout of all union labor working in the greater city. The executive committee of the central body has the matter under consideration, but it is not likely that any immediate recommendations leading toward a general sympathetic strike will be issued at least for two weeks. The absence of popular sentiment in favor of the strikers will doubtless do much to restrain any hasty action on the part of the Central Union organization.

Hearings have been continued by the State Board of Conciliation and Arbitration on the strike situation, and testimony on the strikers' side has been completed. At the request of the board, although not required to do so by the existing statute, the company consented to appear in the later hearings of the week through the persons of its various division superintendents. Counsel for the company, Hon. Henry F. Hurlburt, was obliged to suggest to the labor member of the board, Richard P. Barry, that the company would have to withdraw from the proceedings unless the testimony of its employees was accorded a respectful hearing, on account of the acrimonious comments made by the above member of the board. Practically without exception the division superintendents called testified under oath that the employees who were discharged were required to leave the company's ranks because of unsatisfactory service, fomenting discord, insubordination and disloyalty.

The Boston Chamber of Commerce has prepared a bill for submission to the next Legislature which makes it unlawful for the management of a public utility to declare a lockout or the employees of such an organization to declare a strike until an investigation has been held and a finding made by a special arbitration board of three members under the supervision of the State Board of Labor and Industries.

In an editorial on the strike situation, published on July 10, the Boston *Evening Transcript* said:

"By no stretch of specious reasoning can it be maintained that the Elevated company is without the legal and moral right to run its cars, provided it can get the men for that purpose, and it would have no trouble on that score were it protected in the exercise of its business. This protection the police have tried to give. We can only infer from the incendiary character of the counsel that the strikers are receiving that no action on the part of the guardians of the peace would be satisfactory to them but to stand aside and let violence usurp the place of order.

"If government means anything, these anarchists must be taught a different and more salutary lesson. The lawless and riotous crowds who are at odds with the company have the right to strike if they so desire. They can give up as good positions as there are in any street railway service in the world and join the ranks of the 'unemployed' if that is their preference, but when they stone cars and impose physical injury upon the traveling public they are warring against society as surely as the burglar or the highwayman, and if this is to be a government of laws and not of madmen, they must be shown that their tactics involve serious consequences.

"The street cars are for the accommodation of the public. Doubtless some who sympathize with the main purpose of the strikers are obliged to patronize them, and if every passenger cannot feel that he is protected in this right, then Boston and vicinity are experiencing very humiliating and menacing conditions. Dallying with a situation of this character has proceeded far enough.

MEETING OF JOINT COMMITTEE ON LIFE OF RAILWAY PHYSICAL PROPERTY

The joint committee on the life of railway physical property, representing the American Electric Railway Accountants' Association and the American Electric Railway Engineering Association, met at the Engineering Societies' Building, New York on July 12. The following were present: Robert N. Wallis, treasurer, Fitchburg & Leominster Street Railway; A. R. Patterson, Stone & Webster; Martin Schrieber, engineer maintenance of way, Public Service Railway, Newark. The members of the committee who were unable to attend the meeting were H. E. Weeks, Tri-City Railway & Light Company, Davenport, Ill.; John Lindall, Boston Elevated Railway and F. B. Bachelder, United Railways & Electric Company, Baltimore. The committee considered the work which has been done by individual members and made plans for the report which is to be presented at the convention in Chicago in October.

AUSTRALIAN STREET RAILWAY STATISTICS

According to the official statistics of the Commonwealth of Australia, department of transport and communication, the total street railway trackage in Australia for the fiscal year ending June 30, 1910, was 442 miles, of which 229 miles was owned by private companies. The electric railway trackage amounted to 270 miles. The following figures relate to the last-named mileage:

Capitalization	£6,500,000
Gross earnings	£1,704,493
Operating expenses	£1,168,272
Performance, train miles	30,513,000
Passengers	264,844,000
Cars	1,338
Employees	8,294

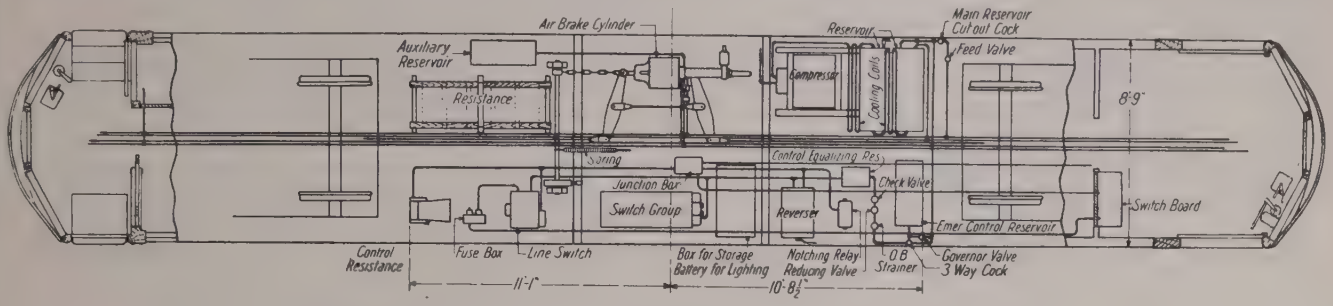
The foregoing figures on capital, gross earnings, operating expenses and passengers carried are approximate, as some of the lines did not furnish complete returns.

Of the total of 442 miles, 164¾ miles is operated in New South Wales and 19 miles in Tasmania. The New South Wales group reports the following data compared with 1909:

	1910	1909
Single track mileage operated	165¾	151¼
Capitalization	£4,668,797	£4,252,731
Capitalization per mile	£28,173	£28,106
Performance, train miles	20,579,386	18,853,621
Gross earnings	£1,185,568	£1,097,565
Operating expenses	£983,587	£857,560
Net earnings	£201,981	£222,005
Ratio of operating expenses to gross income in percentage	82.96	79.77
Gross earnings per train mile in pence	13¾	14
Operating expense per train mile in pence	11½	11¼
Surplus per train mile in pence	2¼	2¾
Interest on investment in per cent	4.53	5.61
Rolling stock	1094	1014
Total employees	6381	5887
Officers only	313	284

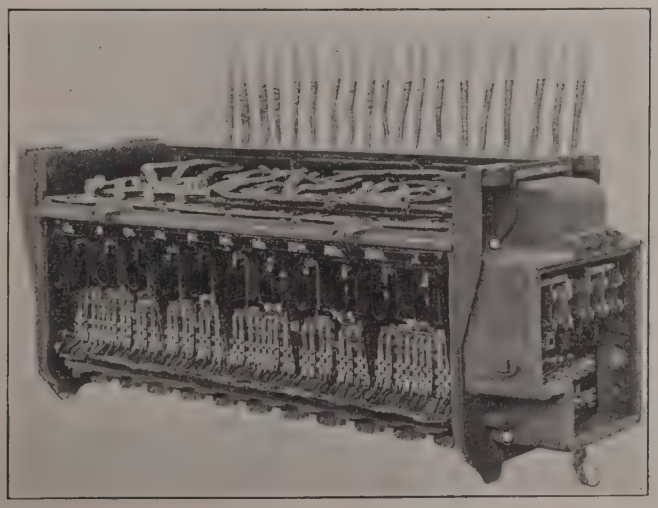
AL CONTROL EQUIPMENT FOR THE LEHIGH VALLEY TRANSIT COMPANY

Six type AL (automatic line-operated) control and quadruple No. 303, 100-hp, 500-volt motor equipments have been purchased by the Lehigh Valley Transit Company, Allentown, Pa., for use on new cars for high-speed service to Philadelphia. Some interesting and unusual features are involved in the construction of the control in that it is arranged to operate interchangeably in the same trains with the type M equipments of the Philadelphia & Western Railroad, and in that a notching relay is provided whereby the cars may be accelerated on grades at satisfactorily high speeds.



Lehigh Valley Cars—Layout of Electrical and Braking Equipment

Type AL control is similar in general principle to HL control. The essential difference is that AL control provides automatic acceleration. The current for operating the control-magnet valve is taken from the line as with HL equipment. With AL control, instead of regulating the car by moving the controller one notch at a time, the motorman places the handle on one of the three ("switching," "series" and "parallel") positions, and the pneumatically operated switches then close automatically under the direction of the current limit switch until the connections corresponding to the position of the controller handle are effected. One of the principal reasons why AL control was adopted by the Lehigh Valley Transit Company was to provide for the operation of its cars in a common train with the cars of the Philadelphia & Western Railway.

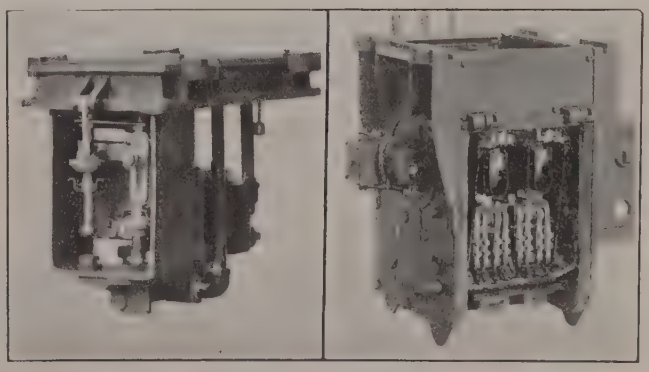


Lehigh Valley Cars—Switch Group

In addition to the usual current limit switches, reversers and other devices, the control equipment consists of thirteen pneumatically operated switches, eleven of which are assembled in the common frame or switch group. The remaining two switches are assembled into a separate smaller frame or line switch. The two switches in this, in addition to their ordinary function, operate as a circuit-breaker and open automatically and cut off power from the motors in case of overload or short circuit. These equipments will be similar, in general, to those which are being supplied to the Northwestern Elevated Railway of Chicago, except that they will be arranged for quadruple equipments instead of double.

The notching relay will enable the cars to operate successfully over the heavy grades which must be surmounted on the lines of the Lehigh Valley Transit Company. As a rule equipments arranged for automatic acceleration are not well suited for operation over steep grades, because if the current limits are properly adjusted to give a reasonable acceleration on the steep grades, then the acceleration on the level will be unduly rapid. On the other hand, if the acceleration is adjusted for the best results on the level it may be entirely too slow on steep grades.

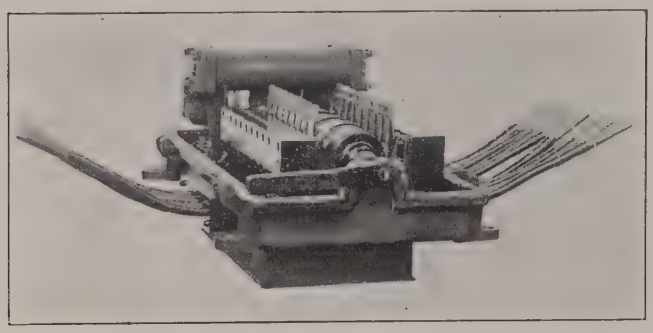
As above noted, it was necessary for the Lehigh Valley Rapid Transit Company to adopt cars with automatic acceleration in order that it might run in trains with other cars arranged for automatic acceleration. To care for this situation, and at the same time to provide for proper service over the steep grades encountered on the company's own line, the notching relay, which is governed by means of a push button in each cab, was devised. In case the motorman finds a car is not accelerating properly on a grade because the limit switches have been set for acceleration on the level, he can, by pressing the button, bring in the switches irrespective of the current limit switch. Owing to the peculiar design of the notching relay, however, he can bring them in only at a rate which prevents abuse of the equipments.



Lehigh Valley Cars—Relay and Line Switch

This notching relay consists of a magnet valve and pneumatic cylinder similar to those used for operating the switches. Carried on the piston rod of the cylinder are two sets of contacts, one of which is normally closed and the other normally opened. The disk of the current limit switch is short-circuited through these two sets of contacts. Whenever the push button is pressed the magnet valve of the notching relay is energized and the cylinder operated. The operation of the relay first closes the set of contacts, which are normally opened, and then opens the set which

are normally closed, leaving the two sets both closed and the current limit switch short-circuited only long enough to bring in a single one of the switches. To bring in a second switch the button must be released and held open long enough to permit the piston of the cylinder to return to its normal position, and the button must then be pressed again. By repeated pressure on the button, with the proper pauses between presses, the switches can all be



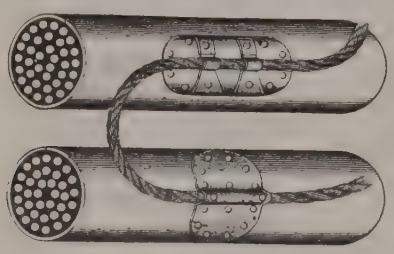
Lehigh Valley Cars—Reverser

brought in one at a time regardless of the current limit switch, but the length of the pause required between presses is such that the necessary time element to prevent abuse of the equipment is obtained. Aside from the use of the notching relay and the operation of the switches from line current, by means of a control resistance in the same general way as with the type HL equipments, the AL control apparatus is essentially the same as the well-known Westinghouse unit switch aparatus for automatic acceleration operated from storage batteries.

ATTACHING PLATES FOR GROUND WIRES

To provide a convenient means for attaching bonds or grounding wires to cable sheaths or piping, the patented attaching plates and bond wire shown in the accompanying illustration have been placed upon the market by T. J. Cope, of Philadelphia. These are made in the two styles shown, the one with the rigid bond wire connection being manufactured in two standard sizes. They are furnished with bond wire of any desired size and length.

The plates are made of copper, perforated as shown, and are completely covered with a film of solder for protection against corrosion, as well as for convenience in application. In applying the plates, the surface of the cable sheath which is to be protected is scraped clean at the point of attachment, the plate bent to fit the contour of the cable



Ground Wire Attaching Plate

sheath, and the turned plate sweated on by a moderately hot soldering iron. The plates are made sufficiently thin to be easily bent as required by the pressure of the fingers, and the perforations enable an even and continuous solder joint to be made over the whole surface of the plate in contact with the cable sheath. The standard form of bonding wire furnished with the plates is a ¼-in. stranded copper cable composed of forty-two wires, each of which is separately covered with solder mortar to prevent any local electrolytic action which might be set up between exposed copper and the other metals under the influence of moisture.

The lower one of the two types of plate shown in the illustration has a pair of clips attached at one end to the plate. These are bent over the bond wire and their ends inserted in slots in the plate, as shown in the cut. This type is therefore adjustable to any size of wire and can be very conveniently applied to the cable sheath before the bond wires are connected to it.

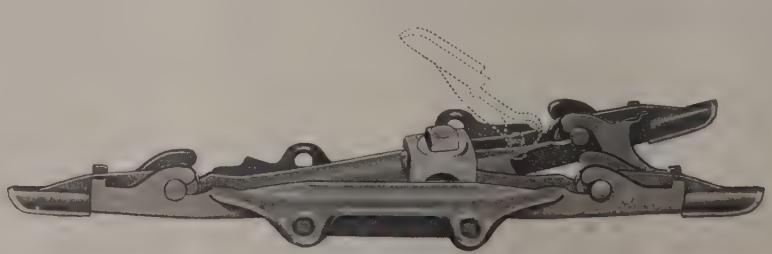
INSTALLATION OF AUTOMATIC ELECTRIC SWITCHES IN PHILADELPHIA

Electrically operated switches manufactured by the Cheatham Electric Switching Device Company, Louisville, Ky., have been installed by the Philadelphia (Pa.) Rapid Transit Company at the following intersections: Eighth Street and Susquehanna Avenue, Ninth Street and Arch Street, Tenth Street and Arch Street, Twelfth Street and Arch Street, Sixtieth Street and Baltimore Avenue. Hand-operated switches to the number of fifty have been displaced by the use of the automatic switch and an additional fifty Cheatham electric switches will be installed at downtown points. The delays to traffic will be reduced materially by the use of these switches and the car capacity of the downtown terminals will be correspondingly increased. The unsightly switchman's house which occupies prominent places in the downtown streets will thus be removed.

A NEW TROLLEY FROG

The frog shown in the illustration is a new design brought out by the Ohio Brass Company. It consists of only six parts, so that the time and labor necessary for its installation are reduced to a minimum. The most important feature of the design is the combination renewable bronze tip and cam wedge. This piece is made to slip under hooks on the pan casting and has a cam action upon the trolley wire, forcing it down into the bottom of the groove in the pan and holding it securely whether the wire be new or badly worn.

When the frog is installed the wires are attached to the pan by the central clamp and a single machine bolt. The renewable tips are then inserted under the hooks upside down with the ends pointing toward the center of the pan and are forced over and outward until the lips inclose the wire ready to be peened around it. This is the final operation of the installation. In this position the tips are interlocked with the end of the pan casting so that it is impossible for them to work out from under the hooks. When



Trolley Frog with Removable Ear

worn, the tips may be easily renewed without unfastening the wires from the pan casting.

The arms are provided with long gradual inclines which give an easy approach and the sides of the pan are flared outwardly at the ends to draw in any size wheel. A deflector bar between the diverging arms prevents the harp from being wedged in the frog in case the wheel jumps off the trolley wire. The frog is made either of bronze throughout or else with a sherardized malleable iron pan and bronze tips and is furnished for all sizes of wire.

News of Electric Railways

Report of Results With Low Fare in Toledo

Nau, Tanner & Swearingen, expert accountants, submitted on July 6, 1912, a report of their investigation of the operation of the Toledo Railways & Light Company's lines under the low fare plan. It indicates that while passenger traffic has been stimulated, the operating and maintenance charges have increased to such an extent that there is an apparent decrease in the profits of the company. The company now issues 3-cent fare tickets good during the rush hours, morning and evening, and six tickets for 25 cents good at all hours. The report covers a period of four months from Jan. 1, 1912, to April 30, 1912. At the beginning of this period the old rate of fare was in effect and this, of course, increased the average somewhat.

The actual number of passengers carried in the four months was about 1,000,000 more than the estimated number, which was based upon the business done in other years. The total number of revenue passengers carried was 13,500,000, while the average rate of fare per passenger was reduced from 4.74 cents to 4.03 cents. The gross earnings decreased from $593,471 for the same months last year to $588,173, while the net earnings decreased from $191,683 to $110,065.

As a result 5.57 revenue passengers per car mile were carried instead of 4.94, as would have been the case had the revenue passengers and car miles operated increased in the same ratio as the average for the past nine years. The expected results under the old rate of fare would have been 23.66 cents per car mile, whereas the actual receipts under the reduced fare were 22.42 cents per car mile. The greatest increase in the number of passengers was noted immediately after the new tickets were put on sale. The average rate of fare in February was 3.98 cents, in March 3.97 cents, and in April, 4 cents. The average fare was 4.03 cents at the old rate of eleven tickets for 50 cents during the early part of January.

For the first four months of each of the following years the receipts from passengers were as follows:

1909	$466,413
1910	518,619
1911	551,486
1912	544,405

Excluding taxes and interest, of which no account has been taken, the report shows in the following table the gross earnings, operating expenses, maintenance and net earnings of the railway department, including receipts from city fares, suburban, chartered and freight cars, for the first four months of the years indicated:

	1909.	1910.	1911.	1912.
Gross earnings	$505,355.60	$558,523.86	$593,471.46	$588,173.00
Operating expenses	217,801.72	239,577.57	256,493.47	332,396.98
Maintenance	78,714.59	120,817.63	145,294.20	145,711.02
Net earnings	208,839.29	198,128.66	191,683.79	110,065.00

The report stated that it is rather the province of a street railway expert than an accountant to explain the increase in the operating expense, but that a contributing cause was the increase in wages of the motormen and conductors in January, 1912. Another cause was the increased expense of sanding tracks and clearing away snow, due to the very severe weather early in the year. An arbitrary charge is made for maintenance. While the power expenses were formerly distributed among the various departments, the company now makes an arbitrary charge per kilowatt hour for the current furnished the cars.

Comments are made on the average receipts per car mile. In April they were 22.86 cents, about the same as the figure upon which Cleveland is endeavoring to maintain its system. The report does not indicate whether or not this is sufficient for the purpose.

The company began placing material for double-tracking Monroe Street between Nineteenth Street and Lawrence Avenue on July 5. The old track is being torn up and the improvement will be pushed to completion rapidly. The new track will probably be ready for service in September.

It is likely that another meeting of the committees of the bondholders and stockholders of the company will be held in New York with a view to adjusting the differences between the two classes of investors and formulating a plan satisfactory to all.

Attitude of City Officials of Kansas City, Mo.

Henry L. Jost, Mayor of Kansas City, Mo., recently made public a statement in regard to the attitude of the city officials toward the Metropolitan Street Railway, which he concluded in part as follows:

"The city counselor, Judge Evans, and I have devoted all the time we could possibly command since we assumed office last April to an investigation of street railway conditions. We have interviewed many persons, inspected records, received many useful and helpful suggestions from numerous public-spirited citizens and heard the statements and arguments of the receivers of the Metropolitan Street Railway, in support of which they have submitted considerable documentary matter which remains to be examined. The facts relating to the financial condition of the street railway are hard to obtain. The business history and evolution of the system are intricate and very difficult to understand. The books kept by the company itself are the main source of information. We have, however, obtained much help from gentlemen associated at former times in an official way with the building and development of the properties. We have collected as much information as we could, time considered. It is our purpose carefully to go over the facts obtained and to give to the receivers our answer as to whether we shall abandon the present operating contract or take steps to enforce it.

"If, in the meanwhile, any citizen knows of any fact which will throw any light on the question to be answered, or which will help us to solve this perplexing problem, I respectfully invite him to communicate it to us, either in writing or in person. We need all the help we can get. The gentlemen on the other side, representing the railway properties, are skilled in this matter and, be it said to their credit, they are loyal to the interests they represent. They have a ready and perfect knowledge of the subjects with which they deal. Judge Evans and I must acquire our knowledge of the subject the best way we can.

"If I conclude that the railway can perform its present contract, and that there is no reason for the abandonment of the present agreement, it will then be up to me to ascertain if the federal court can lawfully hold the city at arm's length while the railway continues to occupy our streets and do nothing except what it is permitted to do by the court. If, on the other hand, I conclude that the best interests of the people require a reformation of the contractual relations between the city and the railway, I shall act without hesitation along this line, keeping in mind my pledge not to surrender any existing right possessed by the people and to give the city as much advantage as possible in any new agreement.

"There has been some criticism by the press of what they have termed 'secret conferences.' A stenographic report has been kept of these 'conferences' and this transcript, when completed, will be open to inspection by any citizen who desires to read it. Moreover, the reporters were called in at the end of every meeting and given a statement of what had transpired at that meeting. Judge Evans and I will continue to transact this business just as other business of the city is transacted, doing the best we can in behalf of the city and shirking no responsibility which rightfully rests upon us."

The Kansas City, Kan., commissioners have voted to accept the invitation of R. J. Dunham, one of the receivers for the Metropolitan Street Railway, to appoint a representative of the city to act with the appraisers who will value the company's lines in Kansas City, Kan.

F. A. Sager and a corps of assistants have begun the preparatory work incident to the appraisal of the property of the Metropolitan Street Railway to be made by Bion J. Arnold, Chicago.

Electrification of Southern Pacific Company's Portland Lines

The Southern Pacific Company has acquired the property of the Portland, Eugene & Eastern Railway, the Salem, Falls City & Western Railroad and the Canby-Molalla Railroad, and has announced through E. E. Calvin, vice-president and general manager of the company, plans for the electrification of its lines out of Portland, Ore., which will involve the expenditure of about $8,000,000. By its purchase of the property of the Portland, Eugene & Eastern Railway the Southern Pacific Company also secures the Salem Street Railway, for that property was purchased some time ago by the Portland, Eugene & Eastern Railway from the Portland Railway, Light & Power Company, as stated previously in the Electric Railway Journal. The plans for electrification as now announced by Mr. Calvin are a great deal more comprehensive than those outlined several months ago. Mr. Calvin is quoted as follows:

"The Oregon-Washington Railway & Navigation Company already had made a start upon electrical development in the Willamette Valley by arranging to change the West Side lines to McMinnville and when the Southern Pacific Company took over the property last fall it was at once determined by President Sproule to enlarge the plan to take in practically the entire valley. We, therefore, had our agents acquire for the Southern Pacific Company the Portland, Eugene & Eastern Railway and, through it, the Corvallis & Alsea Railroad, which is under construction south to Eugene, and the system in Salem.

"The work of converting lines between Portland and McMinnville to electric operation is well along and all of the material needed is upon the ground. The company will proceed at once with the electrification of the West Side line from McMinnville to Corvallis and of the Corvallis & Alsea Railroad, from Corvallis to Eugene, with a short-line cut-off between Wellsdale and Albany. The company will also electrify the Salem, Falls City & Western Railroad, which is owned by the Southern Pacific Company, from Dallas to Salem, crossing the Willamette River upon the new Salem, Falls City & Western Railroad bridge, which is now under construction.

"Right-of-way is now being acquired for a double-track line, with room for four tracks eventually, between Oswego and Aurora, from which latter point an electric railway will be built parallel to the Southern Pacific Company's present steam line to Salem. The company has under construction a line from Canby to Mollala and from Salem to Fir, and will build a connection between Mollala and Silverton, providing a through line from Canby via Silverton to Salem.

"This development will give the company an interurban electric system of 340 miles, with an additional 35 miles of city lines in Salem, Albany, Eugene and Corvallis. The Southern Pacific Company contemplates as well a branch line southerly from Salem to serve a rapidly-developing territory, and a branch line southeasterly from Lebanon."

A contract has been let to McArthur Brothers & Perk, New York, N. Y., for the construction of all the line of the Coos Bay extension from a point 23 miles west of Eugene to Marshfield. The first 23 miles are being completed by Twohy Brothers.

Inspection of Detroit Property by Foreign Interests

Lord Montagu and Geoffrey Marks spent two days in Detroit, Mich., recently investigating the situation relative to the Detroit United Railway. Both are bondholders of the company and represent other English investors who hold securities of the company. Lord Montagu conferred with F. W. Brooks, general manager of the company. Both gentlemen expressed surprise that a progressive city like Detroit should allow politics to interfere with the adjustment of a difference which affects so vitally the people of the city and the company. The visitors went from Detroit to Montreal to confer with bondholders and stockholders of the company in that city.

The City Council of Detroit has adopted a resolution asking Judge P. J. M. Hally, formerly city solicitor, to prepare a brief to assist the city's legal department in the prosecution of the Fort Street rental case against the company. Mr. Hally had stated that he could not enter the case now without the permission of the court, but asked that a certified copy of this resolution be sent to him so that he could forward it to the court with his request to be allowed to file the brief asked for by the Council.

New Pittsburgh Subway Plan

A new subway plan has been filed with the Council of Pittsburgh, Pa., for consideration. The United Terminal System is furthering the project through A. E. Anderson and asked recently for an amendment to the present subway ordinance to permit the use of the subway for freight traffic. The subway ordinance recently drawn up by the City Council makes no provision for carrying freight.

The plans of the company are summarized in the proposition which the company has submitted to the Council. They call for an expenditure of $100,000,000 over a period of ten years. About 80 per cent. of the money will be expended in the Pittsburgh district. The rapid transit portion of the system will receive the first consideration. To meet local traffic conditions a two-track and eventually a four-track tunnel is suggested from the eastern city line to the western city limits. The road will be operated by electricity, but the steam railroads will be permitted to bring their trains to points of transfer within the city.

Reorganization of Electrical Properties Company

The Electrical Properties Company, control of which was recently acquired by a syndicate composed of the Westinghouse Electric & Manufacturing Company, the Equitable Trust Company, Stone & Webster, and William Morris Imbrie & Company, has reorganized. Alvin W. Krech, president of the Equitable Trust, Henry R. Hayes of Stone & Webster, A. Ludlow Kramer, vice-president of the Equitable Trust, and Guy E. Tripp, chairman of the board of the Westinghouse Electric & Manufacturing Company, have been added to the board of directors. James Imbrie of William Morris Imbrie & Company, has been a member of the board for some time, and will continue on it as the representative of his firm. Other directors are Paul D. Cravath, John Deager, John F. Wallace, F. Q. Brown, Charles H. Allen, H. H. Westinghouse, New York, George Westinghouse, T. L. Brown, H. M. Brackenridge, J. R. McGinley, Pittsburgh, E. G. Tillotson, Cleveland, Horace E. Smith, Philadelphia, and Homer Loring, Boston. John F. Wallace, president of the Electric Properties Company, and of Westinghouse, Church, Kerr & Company, will be chairman of the board of directors. In this position he will have general supervision of the affairs of the corporation and the active direction of the engineering corporation of Westinghouse, Church, Kerr & Company. Albert M. Chambers, formerly associated with W. C. Langley & Company, has been elected first vice-president of the Electric Properties Company.

The Electric Properties Company was incorporated under the laws of New York in May of 1906 with an authorized capital of $6,000,000 of common stock and $6,000,000 of 6 per cent preferrerd stock. Of this amount $6,000,000 of common stock and $3,920,000 of the preferred is outstanding. The Electric Properties Company will strengthen and maintain the efficiency of Westinghouse, Church, Kerr & Company as an engineering and construction corporation.

Straight Fare and No Transfers Under Consideration.—The City Council of Calgary, Alberta, has under consideration a plan to abolish transfers and reduce fares to 2½ cents on the municipal electric railway.

Important Traction Ordinances in Chicago, Ill.—At the regular meeting of the Chicago City Council on July 9, 1912, a number of ordinances were presented which will affect the elevated and surface railways. These ordinances include the electrolysis prevention ordinance, an ordinance to revise the through routes as recommended by the 1907 ordinance and an ordinance to require all cars to stop on the near side of streets.

Organization of Association of Water Line Accounting Officers.—The Association of Water Line Accounting Offi-

cers was organized at Buffalo, N. Y., on June 17, 1912. Included as members of the executive committee of the association are the following, who are connected respectively with the New York Central & Hudson River Railroad, the Delaware & Hudson Company and the Long Island Railroad; A. L. Linn, Jr., as auditor of the Western Transit Company, W. H. Davies as comptroller of the Champlain Transit Company and A. B. Bierck as auditor of the Long Island Railroad.

Chicago Electrolysis Ordinance Passed by the Gas, Oil and Light Committee.—The electrolysis prevention ordinance, which has been discussed before the gas, oil and light committee of the Chicago City Council for some time, was recommended to the Council by the committee on July 7, 1912. It is now necessary for the City Council to publish the ordinance and allow it to lie over one week, bringing it up for final action at the last regular meeting of the Council before the summer vacation. The objections made by all the railways were of no avail and the ordinance was passed by the committee as recommended by Ray Palmer. It is understood that the railways will refuse to accept the ordinance in its present form and that they will resort to the courts to prevent the measure from being enforced by the city.

Order Against Buttons and Emblems in Philadelphia.—On July 8, 1912, the Philadelphia (Pa.) Rapid Transit Company issued the following departmental order in the interest of the effort which it is making to increase the efficiency of the employees in its transportation department: "Contrary to the spirit of divisional order No. 13, dated June 26, 1912, there still exist certain personal antagonisms born of the membership in the various rival affiliations. These differences are much aggravated by the wearing of buttons and other emblems. The plan of cooperative effort now in effect with the men as individuals requires that each man in the employ shall co-operate with his fellow employees, and this regardless of any such affiliations. Motormen and conductors will not therefore in the future be permitted to wear any such badge, button or token while on duty or upon the premises of the company."

Bridge Terminal Improvements in New York.—Bridge Commissioner Arthur J. O'Keeffe of New York has awarded the contract for building the underground connection between the Brooklyn Bridge and the Center Street subway loop to the North Eastern Construction Company. This constitutes the second step toward the rebuilding of the bridge and the erection of the new terminal on Park Row. The first step, which was completed last year, was the widening of the roadways on the bridge. The underground connection, which will cost $408,883.50, will be driven from the Manhattan end of the arch down under the new Municipal building and will require ten months for completion. In the meantime contracts will be prepared for the erection of the superstructure of the terminal, and later the rebuilding of the entire arch will progress as rapidly as possible. The cost of the terminal alone will be $2,500,000, the engineers estimate.

Impeachment of Judge Archbald Demanded.—Formal demand that Judge Robert W. Archbald of the United States Commerce Court be impeached was made to the House of Representatives on July 8, 1912, by the Judiciary Committee. In summing up its opinion the committee said: "Your committee is of the opinion that Judge Archbald's sense of moral responsibility has become deadened. He has prostituted his high office for personal profit. He has attempted by various transactions to commercialize potentiality as a judge. He has shown an overweening desire to make gainful bargains with parties having cases before him. To accomplish this purpose, he has not hesitated to use his official power and influence. He has degraded his high office and has destroyed the confidence of the public in his judicial integrity. He has forfeited the conditions upon which he holds his commission and should be removed from office by impeachment." Judge Archbald was appointed a United States District Judge for the Middle District of Pennsylvania on March 10, 1901, and held that office until January 31, 1911, when he was appointed an additional United States Circuit Judge and designated one of the judges of the United States Commerce Court.

Financial and Corporate

Stock and Money Markets

July 10, 1912.

There was a marked decline to-day in the prices of securities traded in on the New York Stock Exchange. The causes assigned for the decline are the absence of traders from the city on account of the heat and the anxiety of small operators to dispose of holdings taken before the presidential nominations were made on the mistaken assumption that politics is still as important a factor in the trading as it formerly was. Rates in the money market today were: Call, 3@3½ per cent; sixty days, 3@3¼ per cent; ninety days, 3¾@4½ per cent.

In the Philadelphia market the trading was very narrow, but the traction issues were dealt in in small volume at about the same prices as those which prevailed on the previous day.

The market for stocks in Chicago was very narrow, and at the close prices were fractionally lower. In the bond market sales were recorded of Chicago City Railway 5's and Chicago Railways Company Series B's and 5's.

In the Boston market the volume of trading was very small, and lack of support resulted in a number of significant price changes.

The trading in Baltimore was very light and prices showed very little change.

Quotations of traction and manufacturing securities as compared with last week follow:

	July 3.	July 10.
American Brake Shoe & Foundry (common)	a99	a99½
American Brake Shoe & Foundry (preferred)	a116	a118
American Cities Company (common)	33⅞	33
American Cities Company (preferred)	79⅝	a79
Ameican Light & Traction Company (common)	a355	a360
American Light & Traction Company (preferred)	a110	a110
American Railways Company	43¼	a43¾
Aurora, Elgin & Chicago Railroad (common)	a45	a50
Aurora, Elgin & Chicago Railroad (preferred)	a90	a87¾
Boston Elevated Railway	a127	a126½
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	a80	a80
Boston & Worcester Electric Companies (common)	a9⅝	a9⅝
Boston & Worcester Electric Companies (preferred)	a55	a55
Brooklyn Rapid Transit Company	93⅛	91
Capital Traction Company, Washington	a126	a124
Chicago City Railway	a190	a190
Chicago Elevated Railways (common)	a32	a32
Chicago Elevated Railways (preferred)	a92	a92
Chicago Railways, ptcptg., ctf. 1	a90	a90
Chicago Railways, ptcptg., ctf. 2	a25	a24½
Chicago Railways, ptcptg., ctf. 3	a8	.a8
Chicago Railways, ptcptg., ctf. 4	a4	a4
Cincinnati Street Railway	a130	a128½
Cleveland Railway	a105	a105½
Cleveland, Southwestern & Columbus Ry. (common)	*7	a4⅞
Cleveland, Southwestern & Columbus Ry. (preferred)	*40	a33
Columbus Railway & Light Company	a55	a55
Columbus Railway (common)	80	80
Columbus Railway (preferred)	a95	a95
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a100	a100
Denver & Northwestern Railway	*135	a140
Detroit United Railway	a70	a70
General Electric Company	179¾	176¾
Georgia Railway & Electric Company (common)	a125	a125½
Georgia Railway & Electric Company (preferred)	a85	*85
Interborough Metropolitan Company (common)	21½	20½
Interborough Metropolitan Company (preferred)	60¾	58
International Traction Co., 4% bond, rcts	*75	a75
Indiana Union Traction Company	*7	a12
Kansas City Railway & Light Company (common)	a18½	a18½
Kansas City Railway & Light Company (preferred)	a46	a40
Lake Shore Electric Railway (common)	*7¼	a6⅞
Lake Shore Electric Railway (1st preferred)	*91	a85
Lake Shore Electric Railway (2d preferred)	*25	.22
Manhattan Railway	135	135
Massachusetts Electric Companies (common)	20⅝	a20
Massachusetts Electric Companies (preferred)	a93	a94
Milwaukee Electric Railway & Light (preferred)	105	a105
Norfolk Railway & Light Co.	*29	26
North American Company	83⅛	83
Northern Ohio Light & Traction Company (common)	a65	a65
Northern Ohio Light & Traction Company (preferred)	a105	a105
Philadelphia Company, Pittsburgh (common)	a52	a52
Philadelphia Company, Pittsburgh (preferred)	a43½	a43½
Philadelphia Rapid Transit Company	a24½	a24½
Portland Railway, Light & Power Company	*69	a69
Public Service Corporation	112	a111
Third Avenue Railway, New York	39¾	37⅝
Toledo Railways & Light Company	5	a4½
Twin City Rapid Transit Co., Minneapolis (common)	a108½	a110
United Ry. & Electric Company (Baltimore)	a25¾	a25
United Rys. Inv. Co. (common)	30	a28½
United Rys. Inv. Co. (preferred)	a58½	a58½
Virginia Railway & Power Company (common)	50½	a44¼
Virginia Railway & Power Company (preferred)	a87½	a81
Washington Ry. & Electric Company (common)	a92	a92
Washington Ry. & Electric Company (preferred)	a95	a94½
West End Street Railway, Boston (common)	a86	a86
West End Street Railway, Boston (preferred)	a100½	a100
Westinghouse Elec. & Mfg. Co.	a77½	a76
Westinghouse Elec. & Mfg. Co. (1st preferred)	a121	a121

* Last sale. a Asked.

ANNUAL REPORTS

Toledo Railways & Light Company

Results of operation in the year ended Dec. 31, 1911, were as follows:

Railway department:		
Gross earnings		$1,920,698
*Operating expenses	$1,366,737	
Taxes	75,589	
		1,442,326
Net earnings railway department		$478,372
Electric, gas and heating departments:		
†Gross earnings		$1,478,674
Operating expenses	$866,923	
Taxes	75,589	
		942,512
Net earnings electric, gas and heating departments		$536,162
Net income all departments		$1,014,534
Interest		820,424
Surplus		$194,110

*Maintenance railway department at 6 cents per car mile.
†Electric, gas and heating department gross earnings include $250,731, charged railway department for power at 1 cent per kw.

The report says in part:

"In addition to proper maintenance of the properties of the company, $350,772 was spent for improvements and betterments.

"Negotiations between the city authorities and the company relative to obtaining a new franchise have taken place from time to time. Under a temporary arrangement the company is now offering a 5-cent cash fare or sells tickets at the rate of six for 25 cents, with universal transfers, and between the hours of 5.30 and 7.30 o'clock in the morning and 4.30 and 6.30 o'clock in the evening passengers are carried for 3 cents and given transfers. Children under eight years of age are carried for 1 cent during all hours of the day. It is quite probable that no permanent contract will be made with the city until after a ninety day trial of the above rates of fare has been made, in order to ascertain the effect of such rates of fare."

Federal Light & Traction Company

Earnings of companies controlled by the Federal Light & Traction Company, after the elimination of inter-company earnings and provision for reserve funds, compare as follows:

Year Ended Dec. 31.	Gross Earnings	Operating Expenses and Taxes	Net Earnings
1908	$1,127,450	$723,963	$403,487
1909	1,217,434	764,554	452,880
1910	1,352,449	768,659	583,790
1911	1,496,177	887,095	609,082

C. C. Chappelle, vice-president and general manager, says in his statement to the stockholders:

"During the fiscal year ended Dec. 31, 1911, the earning power of the properties controlled by your company, after elimination of inter-company earnings, and including properties acquired, increased from $722,552 to $1,496,177 in gross, and from $314,156 to $609,082 in net earnings.

"Upon March 1, 1911, the company acquired control of the railway, gas, electric and steam-heating properties of Springfield, Mo., and upon Sept. 1 of the electric, gas, interurban and local railway properties of Trinidad, Colo.

"The recent sale to bankers of $3,000,000 thirty-year 5 per cent bonds and $1,500,000 ten-year 6 per cent debentures provides the company with ample cash, first to fund temporary financing necessitated by acquisitions and improvements and, second, to retire all outstanding bonds except $2,000,000 Springfield Railway & Light first lien bonds sold last spring.

"As a result of the substantial increase in earning power and successful financing accomplished, a larger share of the constantly increasing revenue should accrue to the benefit of the common stockholders."

Ottawa Electric Railway

The gross earnings of the Ottawa Electric Railway, Ottawa, Ont., in the year ended Dec. 31, 1911, were $840,680, as compared with $748,708 in 1910 or an increase of $91,972; 19,270,521 passengers were carried, as compared with 16,967,334 in 1910 or an increase of 2,303,187. The net earnings for the year were $354,691, and have been disposed of as follows: Interest on bonds and loans, $37,031; four quarterly dividends of 2½ per cent, a bonus of 2 per cent and one of 3 per cent, making 15 per cent for the year, $187,155; mileage payments, $13,668; taxes, $8,440; placed to the credit of contingent account to be applied to reduction of track renewal, car equipment and other accounts $78,000; transferred to credit of profit and loss account, $30,397.

T. Ahearn, the president, says in part:

"The balance at credit of profit and loss account is now $107,355, and of rest account, $200,000.

"The business of the company has practically doubled in six years; the number of passengers carried in 1905 was 9,891,311, while in 1911 it was 19,270,521.

"The new power house was completed toward the end of the year and the storage battery was renewed; 13,492 ft. of light rails were taken up, and relaid with 80-lb. T-rails; 8,800 ft. of these were laid in permanent pavement of asphalt and stone blocks.

"Our office accommodation having become too small, and the space being required for other purposes, a lot has been secured on the south side of Albert Street near Bank Street, on which it is proposed to build new quarters as soon as this can be arranged.

"With the great development going on in the city your directors look for marked advances in the business of the company as the years go on, and, as in the past, the company will endeavor to provide an up-to-date service."

Vienna Municipal Tramways

The report of the Vienna (Austria) Municipal Tramways for the year 1911 shows a total of 317 miles of single track, of which only 15 miles remain in operation by steam. The electric rolling stock now consists of 1230 motor cars, with a seating capacity of 56,325, and 1419 trailers, with 48,419 seats. The thirty-one new motor cars and thirty of the seventy-one new trailers are of the pre-payment vestibule-platformed type introduced in 1910. The resistances of the new motor cars have been so installed that they can be used for heating the cars in winter. Since April 11, 1911, the company has been operating three-car trains on one of its lines. The total weight of such a train is thirty-four metric tons when carrying sixty-six seated and sixty-eight standing passengers and twenty-four tons when empty. Its maximum capacity is 180 passengers. The total number of passengers carried on the electric lines was 283,270,484, an increase of 2.5 per cent over the preceding year. On Dec. 23, 1911, the company exceeded for the first time the million mark for any one day by carrying 1,086,000 passengers. The number of electric car miles during the year was 53,094,339 miles, an increase of 6.6 per cent. This mileage was covered by 917 motor cars and 966 trailers. The wages for the 10,530 employees were equivalent to 41.3 per cent of the gross earnings. The pension fund had 9567 members and the sick benefit fund had 10,301 members. There was an average of 9.79 sick days per member.

The gross earnings from electric operation were approximately $9,000,000, an increase of 0.7 per cent. The income per car mile was 16.8 cents for working days and 17.7 cents for holidays. The operating expense per car mile, exclusive of expenses for employees' welfare and for accidents, was 10.49 cents as compared with 10.24 cents in 1910. Despite an increase of 6.7 per cent in mileage and the introduction of heavier cars, the increase in cost of power over the preceding year was only 6.3 per cent. This excellent result is ascribed to the use of car meters, to control clocks at time points and to improved methods of instruction.

American Cities Company, New York, N. Y.—Hugh McCloskey, president of the New Orleans Railway & Light Company, and R. L. Montgomery, of Montgomery, Clothier & Tyler, Philadelphia, Pa., have been elected directors of the American Cities Company to succeed Fernand Lapyre, deceased, and to fill a vacancy.

Buffalo, Batavia & Rochester Railway, Batavia, N. Y.—The Public Service Commission of the Second District of New York has closed upon its records the application of the Buffalo, Batavia & Rochester Electric Railway, the Buffalo

& Williamsville Electric Railway, the Buffalo & Depew Railway and the Buffalo, Genesee & Rochester Railway for permission to consolidate and issue stock and bonds. The closing of the case followed the failure of the companies to advise the commission as to whether or not they desired to proceed with the application. Extended reference was made to the plans of these companies in the ELECTRIC RAILWAY JOURNAL of Dec. 16, 1911.

Chicago & Oak Park Elevated Railway, Chicago, Ill.—F. V. Dobbins, receiver of the Chicago & Oak Park Elevated Railway, sold at public auction recently to G. H. Church, New York, N. Y., all the securities of the Chicago & Oak Park Elevated Railroad held by the Chicago & Oak Park Elevated Railway.

Columbia Railway, Gas & Electric Company, Columbia, S. C.—The Columbia Railway, Gas & Electric Company, has purchased the property and rights of the Parr Shoals Power Company, which was organized to build a hydroelectric plant at Parr Shoals, on Broad River, about 20 miles above Columbia. Contracts for engineering and construction work have been awarded to J. G. White & Company, Inc., New York, N. Y. The hydroelectric plant will develop 25,000 hp.

Consolidated Cities Light, Power & Traction Company, New York, N. Y.—The $4,500,000 of 5 per cent bonds of the Consolidated Cities Light, Power & Traction Company, which were offered for public subscription in London, Eng., recently through Lloyd's Bank, at 87½, were oversubscribed within five hours, according to Henry L. Doherty & Company, New York, N. Y. As stated in the ELECTRIC RAILWAY JOURNAL of June 22, 1912, page 1092, the Consolidated Cities Light, Power & Traction Company was organized as a holding company by Doherty & Company.

Denver & Northwestern Railway, Denver, Col.—The following statement was made public following the recent annual meeting of the stockholders of the Denver & Northwestern Railway: "In 1907 the officers of the Denver & Northwestern Railway undertook to carry out a plan agreed to by all the principal stockholders of the company for retiring the bonds of the company and issuing stock of the Denver City Tramway in lieu of stock of the Denver & Northwestern Railway. At that time $4,000,000 of Denver & Northwestern Railway bonds were deposited with the Mercantile Trust Company to be exchanged for new Denver City Tramway securities, and two trust companies in New York agreed to supply the money for discharging the balance of the Denver & Northwestern Railway's bonds. The financial conditions in New York during the fall of 1907 made it impossible for the trust companies to advance the money they had agreed to advance, and it was impossible, therefore, to make the exchange of securities. Later, by authority of the stockholders of the Denver & Northwestern Railway and of the Denver City Tramway, the capital stock of the Denver City Tramway was increased. New bonds of the tramway company were executed for exchanged Denver & Northwestern Railway bonds and are on deposit with the trustees. The exchange was delayed because three issues of underlying bonds of the Denver City Tramway matured at different dates and their refunding had to be financed first. This has been done. The matter has been placed in the hands of attorneys to take the proper legal steps to complete."

Electric Bond & Share Company, New York, N. Y.—An issue of $1,500,000 of 6 per cent preferred stock of the Electric Bond & Share Company is being offered by William P. Bonbright & Company, New York, N. Y., at 100 and accrued dividend.

Electric Properties Company, New York, N. Y.—It is reported that negotiations are pending for the sale of the property of the Union Utilities Company, Morgantown, W. Va., and the City & Elm Grove Railroad, Wheeling, W. Va., to the Electric Properties Company. The proposal, it is understood, includes a plan to connect the systems in Morgantown and Wheeling by the construction of an interurban electric railway between the cities, via Waynesburg and Washington.

Ferdinand (Ind.) Railroad.—The Ferdinand Railroad, which operates an 8-mile railway between Ferdinand and Huntingburg, has been sold to the Vincennes & Southeastern Interurban Railway, Vincennes, Ind.

Freeport Railway & Power Company, Freeport, Ill.—The C. H. Geist Company, Philadelphia, Pa., has purchased the property of the Freeport Gas Light & Coke Company, but has not purchased the property of the Freeport Railway & Power Company.

Lehigh Valley Transit Company, Allentown, Pa.—Warren A. Wilbur, president of the E. T. Wilbur Trust Company, South Bethlehem, Pa., has been elected a director of the Lehigh Valley Transit Company to succeed George O. Albright.

New Hampshire Electric Railways, Haverhill, Mass.—A semi-annual dividend of 2 per cent has been declared on the $3,399,500 of 4 per cent non-cumulative preferred stock of the New Hampshire Electric Railways, payable on Aug. 1, 1912, to holders of record of July 20. This dividend compares with 1½ per cent paid semi-annually since July, 1910, and 1 per cent paid semi-annually from July, 1908, to July, 1910.

New York (N. Y.) Railways.—The Public Service Commission of the First District of New York, at the request of the accident creditors' protective associations, has extended to Sept. 30, 1912, the time during which tort claimants of the Metropolitan Street Railway may avail themselves of the offer of the bondholders' committee and exchange their judgment claims for bonds of the New York Railways.

New York State Railways, Rochester, N. Y.—The Public Service Commission of the Second District of New York has authorized the New York State Railways to execute a first consolidated and refunding mortgage to secure an issue of fifty-year 4½ per cent bonds to the amount of $50,000,000. The company is also authorized to purchase all of the outstanding stock of the Syracuse Rapid Transit Railway not now owned by it consisting of common stock to the amount of $768,000 and preferred stock to the amount of $1,000,671.74. The sum of $80 per share is to be paid for the common stock and $110 for the preferred stock. Authorization is given to issue bonds to the amount of $4,736,842, to be sold at 95 to discharge outstanding bonds to the amount of $4,500,000 issued under the mortgage of March 10, 1910. Bonds to the amount of $1,926,672 are also authorized to be sold at not less than 95 to purchase the preferred and common stock of the Syracuse Rapid Transit Railway. The New York State Railways is also authorized to issue bonds to the amount of $128,315 at not less than 95 to reimburse the treasury for previous expenditures for preferred stock of the Syracuse Rapid Transit Railway. The applicant is also authorized to purchase in addition six shares of the stock of the Oneida Railway, which will make the New York State Railways owner of all of the stock of the Oneida Railway.

Pine Bluff (Ark.) Company.—The Pine Bluff Company, incorporated some time ago by the interests which purchased the property of the Citizens' Light & Transit Company, Pine Bluff, has elected officers as follows: F. J. Bridges, president; H. R. Dennis, vice-president; Byron C. Fowles, secretary, treasurer and purchasing agent; Roy Fowles, auditor; Minor Woodward, claim agent; Frank Emerson, chief engineer of the power station; W. P. Koon, master mechanic.

Public Service Railway, Newark, N. J.—The Board of Public Utility Commissioners has approved a plan under which the Trenton Terminal Railroad, a branch line connecting the Elizabeth, New Brunswick & Trenton Railroad with the Interstate Fair Grounds at Trenton will transfer a majority of its capital stock to the Public Service Railway. The board has also approved the lease of the branch line by the Elizabeth, New Brunswick & Trenton Railroad to the Trenton Terminal Railroad.

Valley Traction Company, Lemoyne, Pa.—Interests represented by State Senator Sproul, Chester, Pa., have purchased control of the Valley Traction Company, which operates from Harrisburg to Carlisle, New Cumberland, Marysville and other cross-river points, and have given notice that on July 25, 1912, they will apply to Governor Tener for a charter for a new corporation to be known as the Valley Railways.

Vicksburg Light & Traction Company, Vicksburg, Miss.—The Vicksburg Light & Traction Company was incor-

porated in June, 1912, to succeed the Vicksburg Traction Company and the Vicksburg Lighting Company. The company has outstanding $1,000,000 of stock, $600,000 of first mortgage 5 per cent bonds and $200,000 of ten-year 6 per cent debenture bonds. The total authorized issue of first mortgage 5 per cent bonds is $1,500,000. Of this amount $900,000 is reserved for additions and extensions. The $600,000 of first mortgage 5 per cent bonds are being offered for subscription by a syndicate which includes Charles S. Kidder & Company, Yard, Otis & Taylor and the Central Trust Company of Illinois, Chicago, Ill. These bonds are dated July 1, 1912, and are due July 1, 1932, but are redeemable on any interest date at 105 and interest. The principal and interest are payable at the office of the Central Trust Company of Illinois, trustee.

Dividends Declared

Brooklyn (N. Y.) City Railroad, quarterly, $1.

Dayton & Troy Electric Railway, Dayton, Ohio, quarterly, 1¼ per cent, preferred.

East St. Louis & Suburban Railway, East St. Louis, Ill., quarterly, 1¼ per cent, preferred.

El Paso (Tex.) Electric Company, 3 per cent, preferred.

Fort Smith Light & Traction Company, Fort Smith, Ark., quarterly, 1¾ per cent, preferred.

Holyoke (Mass.) Street Railway, 4 per cent.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Mexico (Mex.) Tramways, quarterly, 1¾ per cent.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1 per cent, preferred.

Ottumwa (Ia.) Railway & Light Company, quarterly, 1¾ per cent, preferred.

Public Service Investment Company, New York, N. Y., quarterly, 1½ per cent, preferred; 2 per cent, common.

Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 1½ per cent preferred; 1 per cent, common.

Railway & Light Securities Company, Boston, Mass., 3 per cent, preferred; 2 per cent, common.

United Traction, Pittsburgh, Pa., 2½ per cent, preferred.

West Penn Traction Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred.

York (Pa.) Railways, $1, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS.

Period.		Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1m.	May, '12	$398,320	....	....	....	....
1 "	" '11	399,207	....	....	....	....
11 "	" '12	4,340,638	....	....	....	....
11 "	" '11	4,110,471	....	....	....	....
AURORA, ELGIN & CHICAGO RAILROAD.						
1m.	May, '12	$159,262	$94,258	$65,004	$35,931	$29,073
1 "	" '11	152,751	89,935	62,816	35,843	26,974
11 "	" '12	1,664,062	943,082	720,980	403,238	317,742
11 "	" '11	1,574,293	912,122	662,171	380,107	282,064
BANGOR RAILWAY & ELECTRIC COMPANY.						
1m.	May, '12	$53,790	*$24,018	$29,772	$16,498	$13,274
1 "	" '11	41,750	*20,882	20,868	12,483	8,385
11 "	" '12	594,032	*266,838	327,194	164,908	162,286
11 "	" '11	525,400	*244,963	280,437	134,046	146,391
CLEVELAND, PAINESVILLE & EASTERN RAILROAD.						
1m.	May, '12	$33,673	$18,537	$15,136	$9,927	$5,209
1 "	" '11	33,138	18,096	15,042	8,113	6,930
5 "	" '12	129,553	80,848	48,706	49,452	†747
5 "	" '11	127,953	73,221	54,732	40,804	†13,928
CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY.						
1m.	May, '12	$100,778	$57,921	$42,857	$30,638	$12,219
1 "	" '11	97,116	53,698	43,418	29,946	13,472
5 "	" '12	436,705	271,021	164,685	151,604	13,081
5 "	" '11	424,028	247,352	176,676	150,095	26,580
LAKE SHORE ELECTRIC RAILWAY.						
1m.	May, '12	$107,140	$63,353	$43,587	$34,690	$8,897
1 "	" '11	105,322	54,430	50,892	34,584	16,308
5 "	" '12	466,337	294,237	172,099	173,737	†1,638
5 "	" '11	444,636	254,947	189,689	173,398	†16,291
NORTHERN OHIO TRACTION & LIGHT COMPANY.						
1m.	May, '12	$255,104	$142,804	$112,300	$43,821	$68,479
1 "	" '11	228,693	124,657	104,037	44,329	59,708
5 "	" '12	1,100,375	638,342	462,033	219,108	242,925
5 "	" '11	977,579	562,041	415,538	221,774	193,764

*Includes taxes.
†Deficit.

Traffic and Transportation

A Word About the Car Crews.

In the paper "Talking to the Public," which he presented at the recent meeting of the Central Electric Railway Association at Cedar Point, Ohio, A. D. B. Van Zandt, publicity agent of the Detroit (Mich.) United Railway, reviewed briefly the campaign with paid newspaper advertisements which is being carried on by that company. Abstracts from some of these talks appeared in the Electric Railway Journal previous to the presentation of the paper by Mr. Van Zandt at Ceder Point One of the most striking of the recent advertisements was published on June 27, 1912, under the caption "Just a Word About the Car Crews." This advertisement follows:

"It is with these, the men on the front end and the men on the back platform, that the public comes most closely in contact and so much so that the tendency of the public mind is to overlook other necessary adjuncts in the business of transporting people.

"In steam road transportation there is always an air of aloofness—a touch of mystery—for the engineer who speeds the train along is never seen, and but rarely is a word exchanged with the conductor except at ticket-taking time. The personal contact on the city trolley car makes for greater familiarity, and so when you are tired and hungry after a day's work it is so easy to become a bit hot-tempered at the man at the motor or the man who calls out the streets. Here is one rule always impressed upon the car crews:

"'Exasperating conditions may arise, but under all circumstances it is required that all passengers will be treated with courtesy and that patience and self-control must be exercised. Loud, uncivil, indecent, profane language or threatening gestures must not be used even under the greatest provocation. Be firm but courteous at all times.'

"Motormen and conductors get into the service through our employment bureau, which requires every application to be filed in writing on special blanks for that purpose. The requirements are citizenship or the possession of 'first papers,' the full legal age, a proper physical condition to be determined by medical examination, and a proper moral condition to be vouched for by not less than three persons, none of whom shall be relatives. Each applicant agrees 'to conduct myself honestly, soberly and with proper obedience to its (company's) officials and courtesy to passengers and the public.'

"In brief, each applicant, if accepted, stands in his relationship to the company and to the people through the company without a blemish; his record is clean as a sheet of white paper, and whatever markings are made thereon are due to the applicant himself.

"Each year the company adds to its force of conductors and motormen several hundred men to take care of the increased business and to fill vacancies caused by deaths, resignations and discharges for cause.

"To obtain these men a much greater number are accepted on the strength of their applications and their medical examinations and sent out for practice. Each is furnished with a rule book to study, and upon which he is later examined by the superintendent. The average duration of studentship is ten days, and surviving that he is placed ninety days on probation. Here comes the acid test of personal responsibility.

"Of those employed not over four out of every ten qualify for the service. Either they themselves find that they are temperamentally unsuited for the work or the company finds this to be the case.

"The right of priority prevails among the men, the oldest having first choice of runs, so that the new men become 'extras,' filling up the holes in the service. Inasmuch as nearly all these men have had other occupations in other days the great majority of resignations come while waiting for regular runs, other work showing up in the meantime. Finally there is a sifting down to those who find themselves adapted to the work and who plan to stay in it, as is witnessed by the fact that 44 per cent of the men belong to the third grade, having been in the service over

eighteen months and drawing the highest pay. In the second grade—those in the service over six months and under eighteen months—are found 25 per cent, while in the first grade of less than six months are found 31 per cent.

"The company at all times is desirous of not only reports upon violations of the rules, but also upon special commendatory acts of its employees."

Formal Order to Prohibit Riding on Running Board

The Connecticut Company, New Haven, Conn., has addressed the following communication to the managers of its different properties in regard to enforcing the recommendation of the Public Utilities Commission of Connecticut to prohibit passengers from riding on the running board of open cars:

"As soon as possible after receipt of same from this office, you will kindly see that two signs forbidding riding on running boards are placed on each side of double truck cars, removing the present signs in double running board cars regarding riding on lower running board. Please post one sign on each side of each single truck open car. These signs should be placed in the clear story in approximately the same position as you placed the signs in the double running board cars.

"Pasters will be sent you to be pasted over the last paragraph on page eight of the book of rules for guidance of conductors and motormen. These pasters may be put in the rule books at the same time as the new paster that is to go on page six, which will be forwarded with pasters for page eight.

"Without waiting for the above mentioned signs please also post on your bulletin board the following bulletin:

"'In compliance with the order of the Public Utilities Commission, dated June 26, 1912, conductors are hereby instructed that this company hereby adopts and issues a rule forbidding and prohibiting passengers from riding on the steps or running boards of all side entrance open cars. This includes both double and single truck open cars. If no seats are available, passengers should be requested not to stand on the running board, but to wait for another car or to stand on the floor of the car in the space between the seats.'"

Accident on Indiana Line.—Four persons were killed and a number of passengers were hurt as a result of a head-on collision between two cars on the Marion, Bluffton & Eastern Traction Company in Marion, Ind., at 3:15 o'clock on July 7, 1912.

Fixed Stopping Places in Lexington, Ky.—The Kentucky Traction & Terminal Company, Lexington, Ky., has adopted the practice of stopping the cars of its city lines only at street crossings and of stopping the cars of the interurban lines only at fixed stations designated by signs suspended from the overhead work in the center of the track.

Ticket Fraud in Michigan.—Four conductors of the Michigan United Traction Company, Jackson, Mich., were dismissed recently for defrauding the company by selling tickets which had been taken up from passengers. It is stated that the four cars in charge of these men showed receipts less by almost $2,000 per month than other cars making similar trips.

Convention Traffic in Baltimore.—It is reported that the total receipts of the United Railways & Electric Company, Baltimore, Md., for the eight days from June 22 to 29, inclusive, the period when the traffic incident to the Democratic national convention was greatest, were upward of $183,000. The total number of passengers handled was 6,944,000 of whom 3,124,800 rode on transfers.

Extension of Owl Service in Philadelphia.—On the night of July 7, 1912, the Philadelphia (Pa.) Rapid Transit Company established all-night service on route No. 4 to Frankford. The Frankford district now has night car lines from the center of the city operating over route No. 4, route No. 5 and route No. 6. Two additional trips, at 1:15 a. m. and 1:30 a. m., are now made over the Torresdale line.

Moving Pictures in Accident Prevention Campaign.—The Public Service Railway, Newark, N. J., has had a number of moving picture films made to show the right and the wrong way to board and alight from street cars and intends to use the pictures in the fall in the campaign of education in regard to safety which is being conducted with the co-operation of the public schools in the territory through which it operates.

Kansas City Smoking Ordinance Repealed.—The measure repealing the ordinance permitting smoking on street cars in Kansas City, Mo., was passed by the upper house of the Council on June 22 and was passed by the lower house by a vote of twelve to four on July 1, 1912. The inconvenience caused the Metropolitan Street Railway by the passage of the original ordinance has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Cleveland Traffic Records Broken.—Officials of the Cleveland (Ohio) Railway believe that the record for the number of passengers carried on its lines on any one day was broken on July 4, 1912. The receipts for the day were $20,441, as against $19,266 on Decoration Day, when 887,311 passengers were carried. The former record for fares collected was made on Oct. 15, 1910, when 888,454 people used the cars and the receipts were $23,649, but at that time the rate of fare was higher than at present.

Electric Service Between Washington and Bluemont, Va.—Electric service between Washington and Bluemont, Va., over the old Bluemont division of the Southern Railway, was inaugurated on July 1, 1912, by the new lessees, the Great Falls & Old Dominion Railway. The first train of two cars left the station at Thirty-sixth Street and M Street northwest at 6 a. m. A regular schedule of six trains daily each has been put in operation, the time between Washington and Bluemont being cut to two and one-half hours.

Moving Pictures of Scene Along Electric Railway.—The Louisville & Northern Railway & Lighting Company, New Albany, Ind., contracted with the Municipal & Commercial Film Company, which made pictures in Louisville, Ky., for the Convention and Publicity League and the Advertisers' Club of that city, to take scenes along the line of the company from the Third Street station in Louisville to the top of Silver Hills, on the Indiana side of the river. The views show the broad sweep of the Ohio River and the scenic beauty of Silver Hills, which overlooks New Albany. The films will be shown at moving picture theaters all over the country.

Circular of the Triple S. Trip.—Willis Arthur Lane, director of publicity of the Central California Traction Company, San Francisco, Cal., has prepared a very interesting illustrated folder of the trip by water between San Francisco and Stockton or Sacramento over the line of the Central California Traction Company between Stockton and Sacramento. There are descriptions of the trip by boat from San Francisco to Sacramento, the trip by electric railway from Sacramento to Stockton and the trip by boat from Stockton to San Francisco. The tickets for the round trip are $2.50 and are good going on Friday or Saturday and good returning Sunday or Monday. There is a map of the territory between the three cities on which the routes of the boat lines and the electric railway are indicated in red ink. The folder itself is printed in red and blue.

Accident Prevention Campaign in Pittsburgh.—The Pittsburgh (Pa.) Railways is conducting a campaign of public education to reduce the number of street car accidents. In a statement prepared by the company instructions are given to parents concerning the parents' ability to prevent accidents to children by the exercise of precautionary measures. The statement also contains instructions for boarding and alighting from cars. Automobilists are asked to co-operate with the company in the prevention of accidents by observing traffic regulations and by being careful. The value of politeness is presented from the sides of the passenger, the employee and the company. Posters have been distributed among the public schools and the children's attention has been directed toward the posters. These posters have also been displayed on the company's property and in prominent places in the city, and their contents have also been published as advertisements in all the local papers. The company has a word of advice to women who alight backward from cars.

Personal Mention

Mr. G. M. Morris has received the title of superintendent of transportation of the Sheffield (Ala.) Company.

Mr. H. B. Johnson, formerly chief engineer of the Sheffield (Ala.) Company, has been appointed general manager of the company.

Mr. F. A. Miller has been appointed master mechanic of the Central California Traction Company, Stockton, Cal., to succeed Mr. B. Clough.

Mr. J. F. Treat, Jr., has been appointed superintendent of the Stockton Terminal & Eastern Railroad, Stockton, Cal., to succeed Mr. J. E. Adams.

Mr. F. J. Blanchard has been elected secretary and treasurer of the Monterey & Pacific Grove Railway, Monterey, Cal., to succeed Mr. A. E. Boynton.

Mr. P. N. Crowell has been appointed purchasing agent of Santa Catalina Island Company, Avalon, Santa Catalina Island, Cal., to succeed Mr. D. P. Fleming.

Mr. David P. Fleming has been elected secretary of the Santa Catalina Island Company, Avalon, Santa Catalina Island, Cal., to succeed Mr. George J. Smart.

Mr. E. F. Davis, who has been treasurer of the Stockton Terminal & Eastern Railroad, Stockton, Cal., has also been elected secretary of the company to succeed Mr. Robert F. Burns.

Mr. A. D. Goldman, St. Louis, Mo., has been elected vice-president of the Walnut Ridge & Hoxie Light, Power & Transit Company, Walnut Ridge, Ark., to succeed Mr. Sol Bertig.

Mr. S. C. Dowell has been elected treasurer of the Walnut Ridge & Hoxie Light, Power & Transit Company, Walnut Ridge, Ark., a position which has recently been vacant.

Mr. W. N. Bagby has been elected secretary, treasurer, general manager and purchasing agent of the Durando Railway & Realty Company, Durando, Col., to succeed Mr. J. D. Adams.

Mr. H. F. Jackson has been elected vice-president and general manager of the Monterey & Pacific Grove Railway, Monterey, Cal., to succeed Mr. F. J. Mott and Mr. F. J. Baum, respectively.

Mr. Charles N. Black, general manager of the United Railroads, San Francisco, Cal., has been elected president of the Monterey & Pacific Grove Railway, Monterey, Cal., to succeed Mr. W. P. Hammond.

Mr. P. C. Dunford has been elected vice-president and treasurer of the New London & East Lyme Railway, New London, Conn., succeeding Mr. Walter R. Denison as vice-president and Mr. S. W. C. Jones as treasurer.

Mr. H. S. Newton, general manager, purchasing agent and claim agent of the Hartford & Springfield Street Railway, Warehouse Point, Conn., has also been elected secretary of the company to succeed Mr. Arthur Perkins.

Mr. A. P. Singer has been appointed chief engineer of the Spy Run power station of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind. Mr. Singer was previously connected with Stone & Webster, Boston, Mass.

Mr. W. T. Woodroofe, who was formerly connected with the British Columbia Electric Railway Company in Vancouver, B. C., has been appointed superintendent of the municipal street railway at Edmonton, Alberta. Mr. Woodroofe has lately been city electrician of Vancouver.

Mr. George E. Tracy has resigned as master mechanic of the Frederick (Md.) Railroad, effective on Aug. 1, 1912. Mr. Tracy was formerly connected with the Washington Railway & Electric Company, Washington, D. C. His previous experience includes service on the Cleveland, Southwestern & Columbus Railway and on the North Jersey Street Railway, now the Public Service Railway, Newark, N. J.

Mr. A. D. Brinkerhoff has been appointed resident manager of the St. Francois County Railroad, Farmington, Mo., of which the National Light & Power Company, St. Louis, Mo., is general manager. Mr. Brinkerhoff was formerly superintendent of the Waco (Tex.) Street Railway, and was connected with that company four years. He was graduated from Cornell University. The St. François County Railroad operates 16 miles of line and has freight agreements with several important steam railroads.

OBITUARY

C. W. Smith, formerly president and general manager of the Los Angeles & Pasadena Electric Railway, Los Angeles, Cal., died at his home in Pasadena, Cal., on July 1, 1912. Mr. Smith was born at Austerlitz, N. Y. He was educated in Ohio and began his railroad career as station agent for the Columbus, Piqua & Indiana Railroad at Woodstock. He was advanced to general freight agent of the company and continued with it for fifteen years. In 1870 he was appointed general freight agent of the Central Pacific Railway with offices in Sacramento. Two years later he became traffic manager of the Chicago, Burlington & Quincy Railway. Later he was connected with the New York, Lake Erie & Western Railroad, the Chesapeake & Ohio Railroad and the Atchison, Topeka & Santa Fe Railway. He was vice-president and general manager of the latter system, and at the same time was general manager of the Atlantic & Pacific Railroad. In 1890 he was appointed receiver of the Atlantic & Pacific Railroad. When the receivership of this road was ended in 1897 Mr. Smith was elected president and general manager of the Pasadena & Los Angeles Railway. Three years later he was appointed to the position of general manager of the Los Angeles Railway.

Cecil B. Smith, formerly second vice-president and general manager of the Mount Hood Railway & Power Company, Portland, Ore., is dead. Mr. Smith was born at Winona, Ont., in 1865. He was educated at the Collegiate Institute, Hamilton, Ont., and at McGill University. He commenced his professional career as resident engineer of the Northern & Pacific Junction Railway. On the completion of this line he became engineer of the St. Catharines & Niagara Railway, and in 1887 he joined the staff of the Canadian Pacific Railway at London, Ont. He was appointed locating engineer of the Toronto, Hamilton & Buffalo Railway in 1888. Between 1889 and 1893 he was connected with various roads in the United States. In 1893 he was appointed assistant professor of civil engineering at McGill University, and in 1899 he was appointed assistant city engineer of Toronto. He next became construction engineer of the Canadian Niagara Power Company. Later he was appointed consulting engineer of the Temiskaming & Northern Ontario Railway. Mr. Smith's knowledge of the power resources of Niagara led to his appointment as chief engineer of the Hydroelectric Commission of Ontario and later to his appointment as a member of the Hydroelectric Commission. Subsequently Mr. Smith designed power plants for the city of Winnipeg, the Nipissing Power Company, the Calgary Power Company, the Mount Hood Railway & Power Company and the Crane Falls Power & Irrigation Company. Mr. Smith was a member of a number of Canadian and American technical societies.

A new agreement in regard to wages has been reached between the Toronto (Ont.) Railway and its employees. The wages of motormen and conductors have been fixed at 23½ cents for first-year men; 25½ cents for second-year men; 27½ cents for third-year men. On Sundays motormen and conductors are to receive an additional 4 cents an hour over the week-day rate. Shedmen and foremen are to receive 27½ cents an hour; assistants to these men, 24½ cents an hour; and car washers, 23½ cents an hour. Motormen and conductors are to pay for their own uniforms for the first year, and pay half the cost the second year. After the second year the uniforms are to be supplied free by the company. The company is to provide seats for motormen on all cars. The general manager or superintendent of the company is to receive a deputation of the men to discuss any matter which may arise under the provision of the agreement. The agreement is to date from June 16, 1912, and is to continue in force for three years. All increases of wages as provided in the agreement are to be effective from the date of the agreement.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Tennessee Railroad, Iron City, Tenn.**—Chartered in Tennessee to build a 35-mile electric or steam railway from Iron City to Olive Hill. Incorporators: C. N. Brady, R. D. Baker, W. W. Collier, I. P. Pendleton and John H. DeWitt.

Morristown Power & Development Company, Morristown, Tenn.—Incorporated in Tennessee to build a railway in Morristown and to other points in eastern Tennessee. The Nolachucky River and the Clinch River will be used to develop power. Incorporators: M. E. McCanless, W. C. Hale, E. M. Grant, W. H. Mullins and John Loop. [E. R. J., June 8, '12.]

***Bryan & Brazos River Railway, Bryan, Tex.**—Chartered in Texas to build a 25-mile electric or steam railway from Bryan to a point west of the Brazos River. Capital stock, $50,000. Incorporators and first board of directors: H. T. Lawler, H. T. Lawler, Jr., Jordan T. Lawler, J. W. Doremus, O. E. Saunders, W. E. Saunders, John K. Parker, E. H. Austin, H. Crenshaw and J. E. Butler, all of Brazos County.

Western Vermont Light & Power Company, Rutland, Vt.—Incorporated to own and operate the hydroelectric plant at Travers Falls, Vt., and to operate the property of the Rutland Railway, Light & Power Company under lease. The Western Vermont Light & Power Company will in turn be controlled by the General Gas & Electric Company, the formation of which was noted in the ELECTRIC RAILWAY JOURNAL of July 6, 1912, page 37. The incorporators of the Western Vermont Light & Power Company follow: A. Livingston Norman, New York, N. Y.; Thomas W. Moloney, W. H. Lawson, Myrick L. Arthur, Albert S. Reed and Charles H. West, Rutland, Vt.

***Morgantown & State City Railway, Morgantown, W. Va.**—Incorporated in West Virginia to build an electric railway from the corner of Front Street and Pleasant Street, Morgantown, and to extend by the most practicable route to the Baltimore & Ohio Railway station at Star City. Capital stock authorized, $10,000. Incorporators: R. B. Reid, W. K. Hoffman, D. C. Hoffman and G. B. Hartley.

***Wisconsin General Railway, Milwaukee, Wis.**—Incorporated in Wisconsin with a capital stock of $25,000. Incorporators: C. M. Rosencrantz, James D. Shaw and Carl Muskat.

FRANCHISES

Sacramento, Cal.—The Oakland, Antioch & Eastern Railway has received a franchise from the Trustees to use M Street from the electric bridge to Third and on Third to I Street in Sacramento.

***New Augustine, Fla.**—The County Commissioners have been asked to grant a franchise to the St. John's Light & Power Company on King Street in New Augustine.

Twin Falls, Idaho.—The Twin Falls Railway has received a franchise to extend its lines in Twin Falls.

Chicago, Ill.—The Chicago Railways has received a franchise from the Council to build 9½ miles of extensions to its lines in Chicago.

Shreveport, La.—The Shreveport Traction Company has received a franchise from the Council to build two extensions in Shreveport. One will extend through Allandale and the other to the City Park. The company will remove part of the present Parkview belt line.

Brookline, Mass.—The Boston Elevated Railway has received a franchise from the Council to relocate its tracks in Washington Street from the railroad bridge in Brookline to Beacon Street.

***Holly Springs, Miss.**—E. G. Hammer, Holly Springs, has received a franchise from the Council to build an electric railway in Holly Springs.

Little Falls, N. Y.—The Public Service Commission, Second District, has granted a certificate of public convenience and necessity to the Little Falls & Johnstown Railroad. The company proposes to build a double track electric railroad in Johnstown via St. Johnsville to Little Falls with a branch from St. Johnsville through Nellistown and Fort Plain to Canajoharie. The route of the main line is about 28 miles and of the branch about 8 miles. The line will supply the part now lacking to complete the chain of electric roads between Buffalo and Hudson. Permission is given by the commission also for the exercise of franchises granted by the different municipalities for which the line will operate. [E. R. J., March 30, '12.]

Syracuse, N. Y.—The Public Service Commission, Second District, has granted the application of the Syracuse Rapid Transit Railway for permission to build a double track extension on Court Street from Third North Street to Seventh North Street in Syracuse with a Y at the intersection of Seventh North Street and Court Street. The extension is 1800 ft. in length and brings the line to within 1200 ft. of the city line. When construction is completed along the intervening distance the company will have cars in operation from the center of the city through Salina, which bounds the Syracuse on the east.

Youngstown, Ohio.—The Mahoning & Shenango Railway & Light Company has asked the Council for a franchise to double-track its line in Steel Street from Mahoning Avenue to the Ohio works, Youngstown.

Galt, Ont.—The ratepayers of Galt, Ont., have voted to renew the franchise of the Galt, Preston & Hespeler Street Railway Company for 10 years.

London, Ont.—The London Street Railway has received permission from the city to remove the Wellington North line from Wellington to Richmond Street, between St. James and Regent Streets, thereby making a direct connection with Broughdale suburb, and has agreed to construct a new belt line along Cheapside and William Streets by Dec. 1.

Windsor, Ont.—The Sandwich, Windsor & Amherstburg Railway, Windsor, has asked the Council for a franchise to double track its lines on Sandwich Street east as far as the Walkerville town limits.

***Wilson, Pa.**—J. E. White has received a franchise from the Council in Wilson. A franchise has been granted by the Supervisors of Jefferson and a franchise will be asked of the Council in Clairton. This is part of a plan to build a line between Wilson and West Elizabeth.

Dallas, Tex.—E. P. Turner, Dallas, representing the Dallas & Western Interurban Railway, has received franchises from the Council in Dallas. This is part of a plan to build a line to connect Dallas, Terrell and Tyler. [E. R. J., May 11, '12.]

Waco, Tex.—The Southern Traction Company, Dallas, has received a franchise from the Council in Waco. It is reported that this line will be extended from Waco to Mooreville and Temple. [E. R. J., June 29, '12.]

Salt Lake City, Utah.—Abel J. Evans, representing the Utah & Salt Lake Electric Railway, has asked the City Commissioners for a franchise over certain streets in Salt Lake City. This line will extend from Salt Lake City to Payson and other southern points. The necessary franchises and right-of-way have been secured. [E. R. J., May 11, '12.]

Milwaukee, Wis.—The Milwaukee Electric Railway & Light Company has received a franchise from the Common Council to extend its Eighth Avenue line in Milwaukee.

TRACK AND ROADWAY

Mesa, Ariz.—A. J. Chandler, Mesa, writes that plans for the proposed electric railway from Phoenix to Mesa have been abandoned. [E. R. J., Aug. 13, '11.]

Argenta (Ark.) Railway.—Work has been begun by this company on the extension of its Main Street line in Argenta to a point just beyond the Fort Smith line of the Iron Mountain system.

Los Angeles (Cal.) Electric Railway.—This company has been asked to extend its lines through Elysian Park and into Griffith Park.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—This

company will soon build a line from Petaluma to Santa Rosa, via Cotati. This is part of a plan to build a more direct line between Santa Rosa and Petaluma.

Sacramento & Woodland Railway, Sacramento, Cal.—This company has completed its line between Sacramento and Woodland and expects to place the line in operation about July 15.

Tidewater & Southern Railroad, Stockton, Cal.—This company has placed in operation the first 8 miles of its line from the Stanislaus River to Modesto.

Connecticut Company, New Britain, Conn.—This company will double-track the Plainville line from the substation at Corbin Avenue to its carhouse C located in New Britain.

Washington Railway & Electric Company, Washington, D. C.—This company plans to build a new line to Cleveland Park and Tennallytown.

***Waycross & Western Railway, Waycross, Ga.**—Work has been begun by this company on its line in Waycross and extending westerly from Waycross.

Indiana Union Traction Company, Anderson, Ind.—This company proposes to double-track its line between Indianapolis and Fort Benjamin Harrison.

Indianapolis, Chicago & Meridian Railway, Indianapolis, Ind.—In order to hold its franchise this company began work on July 1 on Seventeenth Avenue in Gary. Elmer J. Binford, Greenfield, president. [E. R. J., Feb., 24, '12.]

Michigan, Lakeside & St. Joe Electric Railway, Michigan City, Ind.—Plans are being made for the construction of this interurban railway from Michigan City, Ind., to St. Joseph, Mich., and Benton Harbor, a distance of 40 miles. It will follow the shore of Lake Michigan. E. K. Warren, Three Oaks, is interested. [E. R. J., June 29, '12.]

Montpelier (Ind.) Traction Company.—This company, which was recently incorporated, has awarded contracts for surveys, but cannot state definitely when the construction will begin on its 43-mile interurban railway between Marion, Jorden, Dundee, Montpelier, Fiatt, Balbec, Pennville and Portland. The company will operate seven storage battery cars at first. Capital stock, authorized, $150,000. Bonds, authorized, $600,000. Officers: A. E. Townsend, president, general manager and purchasing agent; D. E. Binns, vice-president; C. L. Smith, secretary, and A. H. Bonham, treasurer. [E. R. J., June 8, '12.]

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—As soon as the right-of-way has been secured, this company will build its line between Cedar Falls and Urbana, a distance of 20 miles. The citizens of Brandon and Urbana have subscribed the entire issue of $150,000 of preferred stock of this company to insure the construction of the line. The company plans to build a bridge over Cedar River, 3 miles east of Laporte.

Union Traction Company, Coffeyville, Kan.—The contract has been awarded by this company to build the 11-mile Coffeyville-Parsons line to F. Edwards, of Parsons. Work will be begun at Altamont grading toward Parsons.

Arkansas Valley Interurban Railway, Wichita, Kan.—Grading has been begun by this company on its line from Halstead to Hutchinson.

Kentucky Southwestern Railway, Light & Power Company, Hickman, Ky.—Surveys are being made by this company on its line from Mayfield to Hickman. H. C. Rodes is interested. [E. R. J., June 15, '12.]

Louisville (Ky.) Railway.—This company, which is constructing a 7-mile line to connect the southeastern and southwestern portions of the city, will rearrange the routes of a number of its lines as soon as the new line is completed. The Broadway, Jefferson Street and Fourth Avenue lines are among those which will be affected. It is understood also that the Brook Street line will be extended further south when the new line is put in operation.

Berkshire Street Railway, Pittsfield, Mass.—Plans are being considered by this company to build several extensions in West Pittsfield and the Peck Road extension.

Grand Rapids (Mich.) Railway.—This company plans to extend its Michigan Street line and its Plainfield Avenue line in Grand Rapids.

Michigan United Traction Company, Lansing, Mich.—A party of New York capitalists, accompanied by John F. Collins, vice-president, inspected the proposed extension of the Michigan United Traction Company between Jackson and Adrian, Mich., on July 5. At the latter point the line would connect with the Toledo & Western Railway.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—This company has completed surveys for an extension of its Twenty-second Street line in St. Joseph.

Portsmouth (N. H.) Electric Railway.—This company is now laying 1690 ft. of 9-in. girder rail between Dover Street and Pearl Street on Islington Street, Portsmouth. Steel ties are being used.

Columbus, Newark & Zanesville Electric Railway, Newark, Ohio.—The Public Service Commission has authorized this company to issue $250,000 of bonds to provide funds to extend its line in Newark to Granville Street and to build a new station.

Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio.—Plans are being considered by this company to build a 14-mile line between Ashtabula and Conneaut. This will give the company a continuous line between Cleveland and Erie.

Bartlesville (Okla.) Interurban Railway.—This company will build an extension north from Dewey, Okla., to Caney, Kan., a distance of 30 miles, with the proceeds of $600,000 of bonds which it has sold. The company also plans to build a 6-mile line from Cheyenne north to a connection with the Clinton & Oklahoma Western Railway.

Rapid Transit Interurban Company, Tecumseh, Okla.—J. W. Saxon, of Tecumseh, president of this company, announces that the company will build a line from Tecumseh west to Oklahoma City.

Toronto & Eastern Railway, Toronto, Ont.—The Board of Railway Commissioners has approved the location plans for this projected line through Whitby and Whitby East. A contract has been let to Ewen Mackenzie, Toronto, Ont., to build the line from Bowmanville to Toronto, or to some point near Toronto. The route of the line into Toronto has not been decided yet, but it is probable that at first it will connect with the Canadian Northern Ontario Railway line outside of Toronto. R. H. Rothray, Toronto, superintendent. [E. R. J., June 29, '12.]

Toronto & York Radial Railway, Toronto, Ont.—Surveys have been made for a line to connect the Scarboro and Metropolitan divisions with the Canadian Northern Ontario Railway, in the Don Valley near where the Toronto Eastern Railway will connect.

Oregon Electric Railway, Portland, Ore.—This company plans to build a line from Salem to Roseburg.

Portland, Eugene & Eastern Railway, Portland, Ore.—Plans are being made by this company to double track its line from Portland to Oregon City, on the west side of the river, thence across the Willamette River at Wilamette and to Salem. One of these tracks will be for electric service and the other will be for steam traffic. The steam line from Oregon City to Portland will be electrified eventually.

Saskatoon, Sask.—The by-law has been passed authorizing an issue of $500,000 of bonds to defray the expense of the construction of the municipal electric railway in Saskatoon. The Stone & Webster Engineering Corporation, Boston, Mass., is constructing engineer and work has already been begun. [E. R. J., June 29, '12.]

Baptist Seminary Street Railway, Fort Worth, Tex.—Work has been begun by this company on its 1¾-mile gasoline railway in a suburb of Fort Worth. Capital stock, authorized, $25,000; issued, $25,000. Officers: J. K. Winston, Touraine Building, Fort Worth, president; H. C. McCarty, Main Street, Fort Worth, secretary, and L. R. Scarborough, Seminary Hill, Fort Worth, treasurer and general manager. [E. R. J., June 22, '12.]

Seattle, Wash.—The Board of Public Works has awarded the John Construction Company the contract to construct division A of the municipal street railway from Thirteenth Avenue west and Nickerson Street to Third Avenue and Stewart Street, Seattle. H. R. Dimock, Seattle, city engineer. [E. R. J., Feb. 3, '12.]

SEMINARY ROOM.

SHOPS AND BUILDINGS

Central California Traction Company, Sacramento, Cal.—This company has awarded a contract for the construction of a new freight and passenger station at Coffing.

Sacramento & Woodland Railway, Sacramento, Cal.—This company's new depot at the corner of Main Street and Second Street in Woodland has been completed.

Geary Street Municipal Railway, San Francisco, Cal.—The contract has been awarded for the construction of the new building to be used as an office, substation and carhouse at the northwest corner of Geary Street and Presidio Avenue, San Francisco, to F. Rolandi, San Francisco. The structure will be of reinforced concrete.

Trolley Terminal Company, Oswego, N. Y.—The contract for the construction of a new passenger station in East First Street, Oswego, has been awarded by this company to Peter Roby & Son. [E. R. J., June 15, '12.]

Hudson & Manhattan Railroad, New York, N. Y.—The Hudson & Manhattan Railroad has taken title to the property at 185 Greenwich Street and has completed acquiring the entire block bounded by Church, Cortlandt, Greenwich and Dey Streets. The easterly end of this block is occupied by one of the terminal buildings and a part of the remainder recently was improved with a five-story building adjoining the terminal.

Stark Electric Railroad, Alliance, Ohio.—This company is now building a carhouse in Alliance. The structure is 65 ft. x 220 ft. and of brick and iron construction.

POWER HOUSES AND SUBSTATIONS

Northern Electric Railway, San Francisco, Cal.—It is stated that this company will build a new substation in Yuba City instead of at Sutter City.

Norwich & Westerly Railway, Norwich, Conn.—Ground has been broken by this company for the construction of a new substation near Mastuxetbrook on the Pleasant View extension.

Macon Railway & Light Company, Macon, Ga.—This company has placed an order for twelve 350-kva transformers with the General Electric Company.

Indiana & Michigan Electric Company, South Bend, Ind.—An order for two 46-kva 2300-volt auto regulators and switchboard has been placed by this company with the General Electric Company.

Aroostook Valley Railroad, Presque Isle, Maine.—This company is adding to its equipment two 200-kw rotary converters and switchboard. This apparatus will be furnished by the General Electric Company.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has ordered a 1000-kw rotary converter and a 1050-kva transformer and switchboard from the General Electric Company.

Philadelphia & West Chester Traction Company, Philadelphia, Pa.—This company has purchased for its substation at Llanerch, one 1250-kva Curtis turbo-generator, one 750-kw rotary converter, one 720-kva, two-unit motor-generator set, four 333-kva transformers and switchboard from the General Electric Company.

Pennsylvania Railroad, Philadelphia, Pa.—This company has purchased for installation in the West Jersey & Seashore Railroad substation, apparatus consisting of one 2250-kw two-unit two-bearing reversible frequency changer set, three 700-kva transformers, one 20,000-cu. ft. blower set and switchboard from the General Electric Company. This machine will be used to convert 60-cycle power, purchased from the Atlantic City Electric Company into 25-cycle power to supplement the present power station of the West Jersey & Seashore Railroad for the operation of its electric division between Philadelphia and Atlantic City.

Columbia Railway, Gas & Electric Company, Columbia, S. C.—This company has purchased the property of the Parr Shoals Power Company, organized to build a hydro-electric plant at Parr Shoals, 20 miles above Columbia. A total of 25,000 hp will be developed. Construction work will be carried out by J. G. White & Company, Inc., New York, N. Y.

Manufactures and Supplies

ROLLING STOCK

St. Thomas (Ont.) Street Railway is said to be considering the purchase of several cars.

Fifth Avenue Coach Company, New York, N. Y., has ordered twenty-five double-deck bus bodies from The J. G. Brill Company.

Valdosta (Ga.) Street Railway has ordered three 18-ft. closed cars mounted on Brill 21-E trucks from the American Car Company

Virginia Railway & Power Company, Richmond, Va., has ordered three 26-ft. 1½-in. storage battery cars from the Cincinnati Car Company.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has ordered one 45-ft. work car from the Cincinnati Car Company.

Pacific Coast Railway, San Luis Obispo, Cal., has ordered one 55-ft. all-steel combination passenger and baggage car from the Cincinnati Car Company.

Allen Street Railway, Nazareth, Pa., has ordered two 25-ft. 4-in. closed motor car bodies mounted on Brill 39-E trucks from The J. G. Brill Company.

Carolina Power & Light Company, Raleigh, N. C., has ordered two 20-ft. 8-in. semi-convertible motor car bodies mounted on Brill 21-E trucks from The J. G. Brill Car Company.

Paducah (Ky.) Traction Company is building in its own shops a pay-as-you-enter car, which will be put in service as soon as completed. The company now has one car of this type in operation on the Broadway line and is understood to have under consideration plans to remodel all of its cars so as to contain this feature.

TRADE NOTES

Atlas Engine Works, Indianapolis, Ind., has been placed in hands of F. C. Gardner as receiver, by the Superior Court on the application of creditors. Mr. Gardner is treasurer of the E. C. Atkins Company.

Brownell Company, Dayton, Ohio, manufacturer of automatic and throttling engines, boilers, feed water heaters, etc., has opened a branch office in the Oliver Building, Pittsburgh, Pa., in charge of B. S. Rederer.

Continuous Rail Company, Chicago, Ill., has been incorporated with capital stock of $5,000 to carry on a general rail equipment and construction business. The incorporators are William R. Watson, L. Earle Powell and Albert T. Phelps.

Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., has let contracts for the construction of its No. 3 chipping shop and building, which will be 100 ft. x 600 ft. The three 10-ton cranes for this building were recently ordered from the Alliance Machine Company.

Railway Motor Car Company, Indianapolis, Ind., has been incorporated with a capital stock of $200,000 to manufacture and sell motor cars, also to manufacture railroad equipment. William O. Worth, John D. Worth, Hiram Beshore and E. H. Wolcott, directors. The headquarters will be in Indianapolis.

Heywood Brothers & Wakefield Company, Wakefield, Mass., has elected Charles H. Lang president to succeed Louis E. Carlton, deceased. Mr. Lang was formerly treasurer of the company. Fred L. Butler has been elected treasurer. The vacancy in the board of directors has been filled by the election of Charles A. Stone of Stone & Webster, Boston, Mass.

Bertron, Griscom & Company, New York, N. Y., bankers, have succeeded Bertron, Griscom & Jenks. John S. Jenks, Jr., has retired and Francis T. Homer has been admitted to the firm. All the senior partners continue in the partnership as heretofore, including S. Reading Bertron, Rodman E. Griscom, Marshall J. Dodge, Murray W. Dodge and William Lord Sexton.

U. S. Metal & Manufacturing Company, New York, N. Y., announces that on July 1, it discontinued the agency for axles manufactured by the Carbon Steel Company. On this

date the U. S. Metal & Manufacturing Company took over the account of the Pollak Steel Company, Cincinnati, Ohio, which manufactures high grade heat treated traction axles, tender and driving axles, crank pins, side and driving rods, equalizers and, in fact, all classes of forgings in both iron and steel.

Hess-Bright Manufacturing Company, Philadelphia, Pa., has transferred its office to its new factory at Front Street and Erie Avenue, Philadelphia, Pa. The manufacturing department of the business will be removed during July. The old quarters at Twenty-first Street and Fairmount Avenue have for the past two years been inadequate for the rapidly growing business of the company, and the new site, which covers nearly thirteen acres, affords ample room for much needed expansion. The factory buildings are one story high.

G. E. Pelissier has resigned as superintendent of the Goldschmidt Thermit Company, New York, N. Y. Mr. Pelissier will take a short rest, after which he intends to manufacture and market the Pelissier rail grinder, of which he is the inventor. Mr. Pelissier, prior to his connection with the Goldschmidt Thermit Company, was engineer of maintenance of way for about two years for the Holyoke (Mass.) Street Railway and for the last seven years has been with the Goldschmidt Thermit Company as salesman, engineer and superintendent. On leaving the Goldschmidt Thermit Company the factory employees presented Mr. Pelissier with a gold headed ebony cane and the office employees presented him with a diamond stick pin.

General Electric Company, Schenectady, N. Y., has received the following orders for car equipments: Hot Springs (Ark.) Street Railway, five straight air brake equipments with CP-27 compressors; Texas City (Tex.) Railway, three GE-1022 storage battery car equipments; El Paso (Tex.) Electric Railway, fifty-two K-36 controllers; Omaha & Council Bluffs Street Railway, Omaha, Neb., ten GE-226 45-hp two-motor equipments and ten GE-226 45-hp four-motor equipments; Aroostook Valley Railroad, Presque Isle, Maine, two GE-217 50-hp 1200-volt four-motor equipments and two straight air brake equipments; Grand Rapids (Mich.) Railway, ten GE-216 50-hp four-motor equipments and ten straight air brake equipments with CP-27 air compressors; Chicago (Ill.) City Railway, 125 single-end air brake equipments with CP-27 compressors.

General Fire Extinguisher Company, Providence, R. I., reports another instance in which the Grinnell automatic sprinkler served to check a fire A wrecking car in the Homewood Avenue plant of the Pittsburgh (Pa.) Railways took fire and before the department arrived fifty-seven Grinnell automatic sprinklers were fused and the water formed a complete curtain. The fire itself was confined to the car in which it started and the total loss was only $325. A report in regard to fires in May, 1912, published by the Boston Manufacturers' Mutual Fire Insurance Company, shows sixty-six fires under Grinnell automatic sprinklers, involving a total loss of $4,446 and an average of only $67.40 per fire. Reports are made of twelve fires in properties not protected by automatic sprinklers, in which the total loss was $21,975, or an average of $1,831.25 per fire.

ADVERTISING LITERATURE

Crocker-Wheeler Company, Ampere, N. J., has issued Bulletin No. 151, which describes and illustrates the Remek type of distributing transformer.

Arthur S. Partridge, St. Louis, Mo., has issued List No. 41 of electric and steam machinery which the company has on hand for immediate shipment.

Pyrene Manufacturing Company, New York, N Y., has issued a booklet in which the construction of the Pyrene fire extinguisher is described and illustrated.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued a small handbook containing instructions for operators of its gasoline motor trucks and Little Giant commercial cars.

Curtain Supply Company, Chicago, Ill., has issued a 46-page catalogue which describes and illustrates its complete line of car curtains, curtain fixtures, rollers, diaphragms and curtain materials.

Goldschmidt-Thermit Company, New York, N. Y., has published the second quarterly number of *Reactions* for 1912. It contains numerous articles on rail and industrial welds by the Thermit process.

British Thomson-Houston Company, Ltd., Rugby, England, has issued Description List No. 354, which deals with turbines in general, high pressure turbines, low pressure turbines (mixed pressure type); turbine driven alternators, reducing turbines and small turbines. The sale of Curtis turbo-alternators to municipalities, H. M. Government, tramway, power and railway companies, etc., in the United Kingdom aggregate over 228,609 kw.

NEW PUBLICATIONS

Engineering Valuation of Public Utilities and Factories. By Horatio A. Foster, consulting engineer. D. Van Nostrand Company, New York. Cloth, 345 pages. Price, $3.

This book was prepared in response to the increasing demand for information regarding the subject of valuation. It is intended to present methods employed by such commissions as the Railroad Commission of Wisconsin and by engineers in the valuation of various classes of public utilities. A number of forms used by the Wisconsin commission or prepared by the author are included in the book. Among the phases of the subject which are considered are value and the general purposes underlying valuations, directions for the valuation of tangible property, general instructions for valuation, cost of making a valuation, value which should be allowed for good-will, going concern or going value, depreciation, amortization, the treatment of depreciation funds, appreciation, values and different kinds of franchises, relation between capitalization and value, etc.

Valuation of Public Service Corporations. By Robert H. Whitten, Ph. D. Banks Law Publishing Company, New York, 1912. Cloth, 798 pages. Price, $5.50.

In connection with his work as librarian-statistician of the New York Public Service Commission of the First District, Dr. Whitten has made a close study of the subject of valuation. In this book he takes up only valuations which have been made for governmental purposes by official appraisers, commissions or courts. The study gives primarily the various conclusions found by official or public bodies in reference to the numerous elements of value in a public service corporation and the allowances that should be made therefor. It is a complete record of the decisions of authorities and of the precedents bearing on the various elements of valuation. The scope of the work is shown by a summary of the many various phases of this important subject which are treated, including the fair value for rate purposes, market value, cost of reproduction, actual cost, land valuation, payment for property donated or acquired without cost, property constructed out of surplus, unused property, prices of materials, overhead charges, bond discount, working capital, depreciation, going concern, going value, franchise value, rate of return, etc. The method of treatment of the subjects into which the book is divided is a convenience to the reader. It includes a separation under different headings of the important cases or expressions of opinion by courts and commissions, original definitions by the author, discussions, etc. The book enters fully into the principles underlying the most important cases of valuation which have been carried to the courts and the work of such commissions as those in New York and Wisconsin. A bibliography of valuation and depreciation is included in the book. The author appears to favor the regulation of rates through the application of a sliding scale system, providing for an increase of return to the owners of the property as rates to consumers are lowered. Such a plan has been applied successfully in the Boston gas situation, but has not been made adaptable so far for other utilities generally.

The Council of Los Angeles, Cal., has granted the Pacific Electric Railway a revocable permit to carry express and freight on Main Street, Seventh Street, Ninth Street, Sixth Street and Hill Street. The hours when express cars may be operated are subject to the regulation of the Board of Public Utilities.

BRILL CITY AND INTERURBAN CARS AND TRUCKS BRILL

The Stepless Car

LOOKING down on this crossing of Broadway, 34th Street and 6th Avenue, New York, one usually sees a vast throng of street cars, automobiles, wagons and pedestrians, for it has the densest traffic of any street railway point in the world. The photograph was made at the time of day when the traffic is lightest. No better place could be found to demonstrate the safety features of the Stepless Car. Passengers walk in and out with perfect ease and safety, there being but 10 inches from pavement to car floor; the center entrance has the advantage over end entrances of greater protection to passengers from vehicles. The trucks are enclosed with sheet steel and equipped with low fenders, so that safety to pedestrians is increased. While its highest efficiency is brought out by the most difficult traffic situation, the car is thoroughly adapted to the ordinary conditions of small city service. In short, it has all the advantages of the ordinary type, to which are added a safe and quick entrance and exit, a semi-convertible window arrangement, superior ventilation, a sanitary interior, a large seating capacity, and increasing facilities for the efficiency of the crew. We are the builders of Stepless Cars under the Hedley-Doyle designs and patents which are controlled by the Prepayment Car Sales Company.

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WASON MANUFACTURING COMPANY
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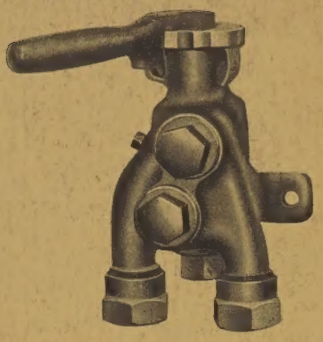
Elizabeth, N. J.

COMPAGNIE J. G. BRILL
Paris, France

BRILL THE J.G.BRILL COMPANY, PHILADELPHIA BRILL

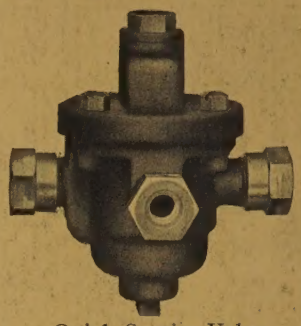
General Electric Air Brake Equipments



S. G. Motorman's Valve, for straight air equipment. Valves of the poppet valve type provided with leather seats which can be easily and cheaply renewed. Stem provided with spherical ball joint to prevent leakage.

Increased schedule speeds, lengths and weights of electric trains have brought improved braking equipments into a prominent position in the electric railway field.

The General Electric Company, anticipating these requirements, has developed and improved every line of braking apparatus necessary for electric railway operation.



Quick Service Valve.
A valve of this type located in the brake cylinder pipe connection reduces the time of application and releases 30 to 50 percent without increasing the size of pipe and consequent waste of air. This valve may be readily applied to equipments already in use.

Straight air equipments for single car operation.

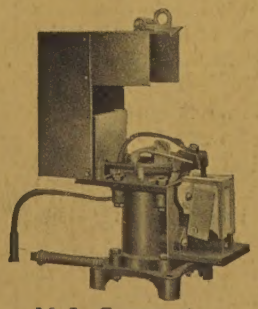
Emergency straight air equipments for single car operation with trailers and short trains.

Variable release equipments for long trains.

Combination straight and automatic equipments for gas electric cars and light locomotives.

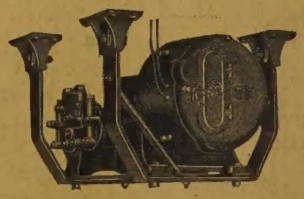
Locomotive equipments for heavy electric locomotive service.

Electro air brake equipments for long trains where heavy and frequent passenger traffic demands smoother stops and a greater measure of safety.



M. L. Governor
Mechanically operated type.

The illustrations show a few of the many improvements in braking apparatus that have resulted in safer and more efficient braking of electric cars and trains and which have been developed exclusively by the General Electric Company.



The C. P. Motor-Driven Air Compressor is dust and waterproof and noiseless in operation.

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